

## Hague Congress Papers Cover Many Phases of Refrigeration

**Editor's Note:** Published on this page is the second group of condensed versions of papers which were presented at the Seventh International Congress of Refrigeration, conducted at The Hague, Holland, June 16-21. First group was published in last week's issue.

The editors feel that these condensed versions of papers prepared by engineers from many countries of the world, will indicate the trend and substance of international research in the refrigeration field.

### Laws Governing Evaporation From Surfaces

By R. W. Powell and Ezer Griffiths  
National Physical Laboratory  
Teddington

Evaporation plays a considerable role in refrigeration work. The cooling which accompanies the evaporation of water has been used for generations as a simple means of refrigeration, whilst at the present day the loss of weight of foodstuffs by evaporation during storage is an important factor.

A review of existing data relating to the evaporation of water discloses considerable diversity in the results of different experiments. An investigation is described which seeks to determine the laws governing this process, attention being given not only to the effect of variation in the condition of the medium into which the evaporation occurs, but also to the influence of the geometrical form of the surface from which the evaporation takes place.

Two surfaces are studied in detail, one a horizontal plane measuring approximately 18 cms. wide and 24 cms. long, and the other a vertical cylinder 18.0 cms. in height and 27.1 cms. in circumference and the results are generalized to provide data for other sizes. In the cases specified above the temperature of the surface is maintained uniform by a number of separate strip heaters. This arrangement enables an estimate to be made of the variation in the rate of evaporation over the area of the surface.

It is found that in the case of the cylinder mounted with its axis perpendicular to the wind direction, the evaporation assumes maximum values at the front and rear surfaces and decreases to minimum values at the sides, whereas, for a plane surface subjected to a tangential wind there is a decrease in the evaporation as the distance from the leading edge increases. It is deduced that for the type of plane surface studied and the range considered:

$$E_{10} = 2.12 \times 10^{-7} p_{0.77}^b (p_s - p_a) \quad (1 + 0.121 u^{0.85})$$

where  $E_{10}$  is the rate of total evaporation in grams per second from a surface of length  $l$  and width  $b$  cms.,  $u$  is the air velocity in cms. per second and  $(p_s - p_a)$  is the vapor pressure difference between the saturated surface and the air at a distance, measured in mms. of mercury.

### Heat Velocity Method Applied to Flow of Refrigerants

By H. Inokuty and Z. Nagaoka  
Institute of Physical and Chemical  
Research, Tokyo

This method is an improvement of the "Salt Velocity Method," in which the measurement of the flow of liquefied refrigerant through pipes is suitably devised.

Similar to the salt velocity method, two sets of electrodes are fitted to the liquefied refrigerant pipe between the condenser and the liquid receiver, and the time required for the passage of firms with different resistance between the electrodes is measured. The difference from the salt velocity method is that a super-cooled liquefied refrigerant is used instead of salt water, and the fact is utilized that the electric resistance of liquefied refrigerant varies as the temperature.

The employment of salty refrigerant is liable to the corrosion of the refrigerating machine and to alter the properties of the refrigerant. The injection of oil or the like may also cause a peak of uneven electric current, as it does not mix well with the refrigerant. Contrarily, the cooling of high temperature liquefied refrigerant is comparatively easy. As the variation of resistance due to the temperature is very small, and as the specific resistance of liquefied refrigerant is large and the surface area of the electrodes is comparatively small, an accurate instrument is necessary to read the peak of electric current as in the cases of the salt velocity method, and its application to the actual tests is not much recommendable.

In the present method, however, the electrodes were connected to form an electric bridge, and the potential difference due to the difference of resistance was magnified by an amplifier. For showing the peak of electric current, there is no easier way than taking photographs by an oscillograph. Therefore, a neon lamp is used so as to light this lamp when the potential difference reaches a definite amount. In other words, the neon lamp is lit whenever the films of different resistance pass the electrodes. Consequently, the neon light is "on" and "off" twice, and the time intervals of the neon light "on" and that of "off" were measured with a stop watch, and their mean value was taken as the time required for the

flow of refrigerant between the electrodes, and from that the velocity of flow was calculated.

As a result of actual application of this method to a 40-ton ammonia refrigerating machine, it was confirmed that the velocity of flow is measurable within an error of about 2 to 3 per cent, except cases of a very low speed or a very high speed.

### Kapok Quilt as An Insulant

By Mims, Etablissement Nik, Paris

Owing to a mechanical process of a special nature and forming the object of a patent in different countries, kapok in the form of a quilt is likely to occupy an important position in the refrigerating industry, each fibre, considered by itself, being impermeable, non-rotting and of extreme lightness.

The whole length of the fibre is preserved by the actual process and the quilt takes form of a homogeneous and coherent product, easy to handle, available in variable thicknesses and dimensions.

Kapok quilt moreover offers the advantage, apart from its very reduced weight, of not padding under the action of vibration or repeated impacts.

Conductivity tests on quilts of this description, measuring 0.68 x 0.68 m. and 0.025 m. thick, weighing 0.597 kg., gave the coefficient  $k = 0.0256$  kcal./m. h. °C.

### Lower Temperature Scale Of Industrial Refrigeration

By B. C. Oldham, Great Britain

The trend of development of manufacturing processes in many industries is to make more and more extensive use of refrigeration at temperature lower than those hitherto employed. Where the temperatures involved are within the range of climatic fluctuations, the object is usually to stabilise a process to ensure continuity of production and consistency of quality all the year round. There are, however, an increasing number of industrial applications at temperatures considerably lower than any climatic or cold storage conditions; for example, ice cream manufacturers find that production can be co-ordinated with sales to cater for sudden weather changes to a closer degree by quick hardening in wind tunnels at -40 to -50 degrees C. than by slow hardening in -25 degrees C. rooms; hardening rooms are thus released for storage purposes and peak requirements are met by simultaneous peak production of finished product.

Dewaxing of fuel and lubricating oils, recovery of solvents, and liquefaction of air, employ low-temperature refrigeration to a much greater extent than hitherto, and separation of individual constituents of gas mixtures is perfected by lower temperatures.

The liquefaction of CO<sub>2</sub> and of NH<sub>3</sub> at low pressures and correspondingly low temperatures in the neighborhood of their respective triple points by the evaporators of refrigerating plants instead of in the condensers of gas pumps, is a recent innovation which has already found considerable application in dry ice factories, and which avoids the wear and tear of high pressure and multi-stage compressors.

These developments in refrigeration requirements have resulted in the evolution of special types of refrigerating machinery and equipment. For intermediate temperatures of -25 degrees C. to -45 degrees C. evaporation the booster compressor of the rotary blower or piston type finds application in raising the pressure of low density vapor to densities at which it can be efficiently handled by compressors of standard design. Lower temperatures are obtainable by refrigerating equipment of the modern absorption type in which temperatures as low as -76 degrees C. (-105 deg. F.) can be economically obtained in commercial practice with ammonia in spite of that temperature being within one degree of the triple point of ammonia and the specific volume being 25 to 30 times as great as at ice-making temperature. Problems peculiar to low-temperature refrigeration are discussed.

### Modern Absorption Machines for Industrial Refrigeration

By G. Maiuri  
Maiuri Refrigeration Patents, Ltd.  
London

This report gives a short theoretical survey of some particularities of modern absorption machines, and a description of some entirely new applications made in the last few years, which have become possible as a consequence of the improvements introduced by the author on the basis of the theory of the reversible absorption machine developed since 1913 by ALTENKIRCH.

The generator and the rectifier

have been improved in order to obtain a reversible working and a perfect purification of the ammonia vapor until 99.9%, or more, which is necessary for the low temperatures.

The absorber has been perfected with a view to operation under very reduced pressure down to 0.06 atm. abs., reaching in some tests the triple point of ammonia, and this kind of absorber allows, in a very simple way, all the possible recuperations of heat, approaching the absorption and desorption machines to the ideal of reversibility.

A description is given of resorption machines and of multi-stage and compound absorption machines. Their possible uses are discussed, with illustrative example of actual applications.

Single stage absorption machines can be employed when the difference between the condensation and evaporation temperatures does not exceed 70° C. A difference of 80° C. has been obtained, but in this case high pressure steam, or when the temperature difference exceeds 70° C., a double stage machine is employed. For instance, with water +15° C. and condensation at +20° F., an evaporation temperature of -70° C. can be obtained.

Compound machines, absorption-resorption, of high coefficient of performance can be used for ordinary refrigeration, such as -20° C. and by recuperations of heat, foreseen by ALTENKIRCH, the heat ratio can be made to reach, or exceed unity. In other words, an amount of cold superior to the quantity of heat spent can be obtained. Resorption machines, working at atmospheric pressure in the evaporator are suitable for moderate cooling, such as is required e. g. for air conditioning.

Combined absorption-diffusion machines, working at atmospheric pressure in the absorber and evaporator may also be used to advantage for purpose. By the addition of air or another inert gas and a slightly higher pressure in the resorber and generator, pressure equalization in the two parts of the machine can be obtained.

A cascade system of absorption machines, the first stage being an ammonia-water machine, and the second a machine using a refrigerating fluid having a very low freezing point and an appropriate absorbent, is proposed for extremely low temperatures, such as -100° F. to -150° C.

### Absorption Machines for Very Low Evaporation Temperatures

By W. Niebergall, Germany

It is shown that absorption machines are particularly suitable for the production of very low temperatures refrigeration. Their advantages in this respect, as compared to compound and three-stage compression plants are set forth. When cooling water conditions are not too adverse, quite low evaporation temperatures can already be obtained by a single stage absorption plant heated with exhaust steam or fresh boiler steam. Then, the use of a heat exchanger

between the cold suction throttling stage, which means a considerable simplification in the control and watch of the plant as against the multi-stage throttling required with compression plants. Further it is pointed out that for a given refrigerating production at decreasing temperatures, the increase in power consumption of the solution pump of the absorption plant is much less than the increase in power consumption of an equivalent compression plant. Illustrative calculation examples and diagrams are given in this connection.

Next, an absorption plant built by the *Rheinmetall-Borsig A. G.* is described. It works with -45° C. at the evaporator and uses 5 atm. gauge pressure steam. The inlet cooling water temperature is +16° C. The operating cycle of this plant is discussed, and the designs of the component parts such as generator, absorber, etc. are described and illustrated.

In a third chapter, test results of low temperature absorption plants are given. The actual cycle performed by the solution is plotted on the Merkel diagram from which the operating process is calculated.

In conclusion, the use of single stage absorption plants for -60° C. evaporation temperature in the MAIURI dry ice production system is alluded to.

### Steam Ejectors

By Fr. Bosnjakovic

Technische Fakultät, Beograd

Steam ejectors, such as used for instance in the steam jet refrigeration system, have as is well known a live steam consumption rate several times greater than the theoretically required value.

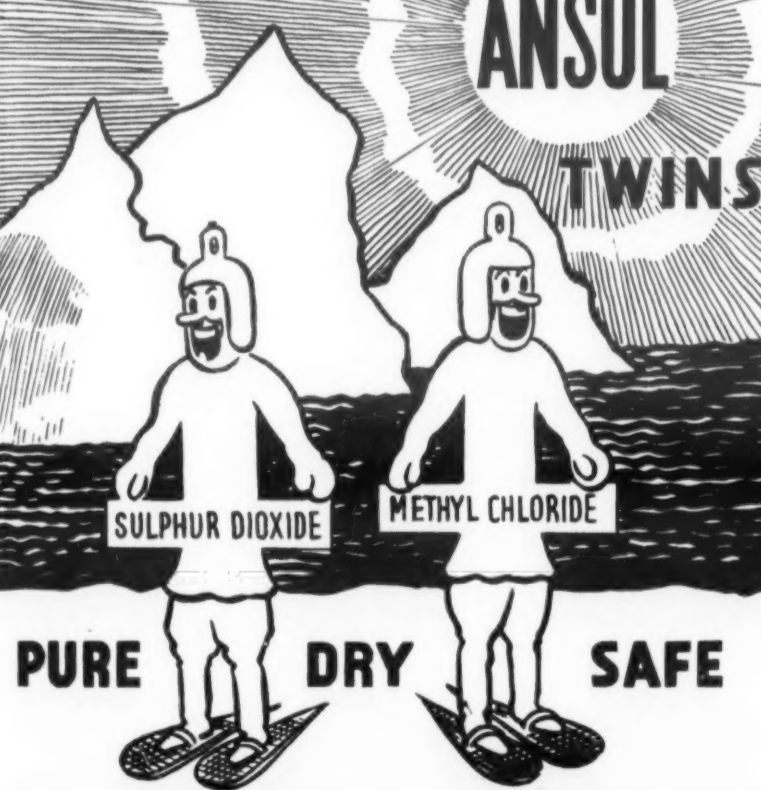
The author developed a method published elsewhere for calculating steam ejectors, and by which it can be shown that the loss on mixing (collision loss) is generally more important than the friction losses in the nozzle and diffusor, so that it would appear worth while to look for the possible ways and means for reducing it. This result may be obtained by having the suction vapors expanded in a nozzle down to a lower "intermediate" pressure so as to have these vapors enter the suction chamber of the ejector at a very high speed. Thereby, collision losses are reduced, resulting in an appreciable economy (some 30%) in live steam consumption. The actual economy obtained and the optimum value for the intermediate expansion pressure of the suction vapor narrowly depend on the pressures and the speed coefficients of the nozzles.

Qualitative theoretical investigations are now under way on the steam ejector operated as an air pump. It would appear that, under certain conditions, several possible working modes of the ejector may coexist, corresponding to different steam consumption rates. The well known particularity of ejectors of suddenly changing their working mode might thus be explained. The phenomenon would then be a consequence of the properties of air-steam mixtures as in a binary system.

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## REFRIGERATION NEWS

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Copyright, 1936, by  
Business News Pub. Co.THREE DOLLARS PER YEAR  
TEN CENTS PER COPY**Units Rated by  
Standard Tests  
Now 'Certified'****Manufacturers Place  
Rating Data on File  
With Associations**

DETROIT—Ratings evolved from tests of commercial refrigerating machines made in accordance with the requirements of the American Society of Refrigerating Engineers "Standard Method of Rating and Testing Mechanical Condensing Units" approved last year (the complete text of which was published in the Nov. 6 and 13, 1935, issues of *ELECTRIC REFRIGERATION NEWS*), are being certified by manufacturers to the Refrigeration Division of Nema or to the Refrigerating Machinery Association.

Following the acceptance of a manufacturer's certified ratings by either one of the association offices, the manufacturer is in a position to state—in price books, advertising copy, and elsewhere—that the equipment he offers for sale has been tested and rated in accordance with ASRE Standards, and that his test and rating

(Concluded on Page 9, Column 1)

**Exhibits Planned at  
N. Y. Electric Show**

NEW YORK CITY—Thirteen refrigerator manufacturers and five manufacturers of oil burning and air-conditioning equipment are among the 150 exhibitors who have announced they will display products at the National Electrical and Radio Exposition, to be held in the Grand Central Palace here Sept. 9-19.

Daily radio broadcasts of star programs and talks by noted air personalities will be features of the program, as will a series of lectures and demonstrations to be given by home economics authorities.

Refrigeration manufacturers entering products at the exposition include Apex Rotarex Corp.; Rex Cole, Inc. (General Electric); Crosley Radio Corp.; Fairbanks, Morse & Co.; Frigidaire Corp.; General Electric (Hotpoint); Kelvinator Corp.; Majestic Radio & Television Co., Inc.; Norge Corp.; Sears, Roebuck & Co.; Sparks-Withington Co.; Stewart-Warner Corp.; and Westinghouse Electric & Mfg. Co.

Exhibitors from the heating and air-conditioning field will include Continental Motors Corp., Delco-Frigidaire Corp., Kelvinator Corp., Norge Corp., and Westinghouse Electric & Mfg. Co.

Heading the committee in charge of the series of daily lectures on

(Concluded on Page 20, Column 4)

**Cleveland Sales Total  
24,755 in 7 Months**

CLEVELAND—Sales of household electric refrigerators in the Cleveland area during the first seven months of this year totaled 24,755 units, an increase of 39.3% over the 17,766 sold during the corresponding period in 1935, according to reports by distributors to Electric League of Cleveland.

**Factors in 1,000 Appliance Purchases Shown  
By General Electric Sales Analysis**

CLEVELAND—Data on the "Who, When, Where, and How" of major appliance sales is contained in a cross-section survey of 1,000 sales of General Electric appliances recently completed under the supervision of Wil D. Galpin, retail sales manager of the company.

The sales were analyzed to determine where people buy appliances, their buying influences, how their names were obtained as prospects, when the sales were closed, and how they were paid for.

More than any other one thing, the survey served to bring out the basic worth of the fundamentals of specialty selling—canvassing, home closing, demonstrating to husband and wife together, and evening calls.

Home closing, the survey showed, accounted for 683 of the 1,000 sales.

**\$80,000 Worth of  
Conditioning Sold  
In City of 80,000**

SIOUX CITY, Iowa—In this Iowa trading center of 80,000 population, \$80,000 worth of air-conditioning systems of the central-station, year-round type have been sold since Jan. 1 of this year, according to a survey made recently by E. B. Moles of Malone and Moles, Carrier dealer here.

Mr. Moles claims that Carrier has obtained approximately three-fourths of this total dollar volume of heavy-duty, central-station installations. His figures do not give information on the smaller room-type unit conditioners of which a considerable number have been sold, he says.

Types of establishments in which installations have been made include women's ready-to-wear shops, restaurants, beauty parlors, an office building, hotels, theaters, and grocery stores.

One retail grocery store that installed air conditioning, relates Mr. Moles, has testified that the additional business directly attributable to air conditioning paid for the entire cost of the system within 90 days. Commenting on this, Mr. Moles declares:

"If retail business establishments would figure that almost the entire gross margin of profit on the additional business secured by air conditioning is clear profit, to be credited without deduction of the usual items of overhead expense, merchants would soon realize the advisability of adding air conditioning."

"For example, consider a retail store doing \$200,000.00 of business per year on a gross margin of 30%. If installation of air-conditioning equipment increased their business only 15%, it would mean an additional yearly profit of \$9,000. All that would have to be charged against this would be depreciation of the equipment, operating cost, and a slight additional insurance cost."

**Air Conditioning Cuts  
Losses for Illness  
In Office 27%**

SAN ANTONIO, Tex.—Installation of air conditioning effected a reduction of 27% in time lost to illness in the insurance offices of the United Service Automobile Association, reports of the company for a 12-months' period show.

Reduction in absences from 7.5 to 5.5 days per employee per year is attributed to air conditioning. On the basis of the average salary paid the 60 employees, the annual saving from the reduction of absences fell short of the \$603 total operating cost of the system by only \$28, the owners say.

**Excise Taxes Total for  
July Is \$982,476**

WASHINGTON, D. C.—Excise tax collections on mechanical refrigerators during July of this year amounted to \$982,476.25, compared with \$826,108.22 during the same month last year, according to a report made public last week by the Commissioner of Internal Revenue.

Only 287 were closed by the salesman on the showroom floor, and but 30 in the husband's business office.

Husband and wife are still the dominant buying influence in appliance selling; 582 of the sales analyzed were made to them together. The housewife ranks next in buying importance, 281 of the sales having been made to her alone. Husbands hesitated to make the purchase alone, only 122 of them trusting their judgment sufficiently to take the final step before determining their wives' preference.

Canvassing continues to be the best method of obtaining prospects, with user leads second by a considerable margin, results of the survey indicate. Five hundred and sixty-two of the 1,000 buyers first reached the pros-

(Concluded on Page 2, Column 5)

**Coming Issues—****TENTH ANNIVERSARY  
SEPT. 9**

A review of the important events which have characterized industry progress during the past 10 years.

**INDUSTRY PIONEERS  
OCT. 7**

A tribute to individuals who have pioneered in the development of the refrigeration and air-conditioning industries.

**PRODUCT DEVELOPMENT  
NOV. 4**

A survey of the significant improvements in refrigeration and air-conditioning equipment, parts, materials and supplies.

**FOREIGN TRADE  
DEC. 2**

An appraisal of the present foreign market for refrigeration and air conditioning and its future opportunities.

**AIR CONDITIONING  
JAN. 6**

An analysis of the accomplishment to date in selling air conditioning to the public, with discussions of the industry's problems by leaders in the field.

**Herbert George to Manage  
Balsam Wool Sales**

ST. PAUL—Wood Conversion Co., manufacturer of insulation materials here, recently appointed Herbert George as manager of its refrigeration sales division, with headquarters at 360 North Michigan Ave., Chicago.

Mr. George has been engaged in sales engineering work for the past six years. In this time he supervised and directed the development of products and machinery for the processing of Balsam Wool fibre slabs in the cabinet builders own plants.

Previous to his connection with the Wood Conversion Co. Mr. George was with the Frigidaire Corp., where he was senior insulation engineer. He had charge of this company's proving laboratory at New Orleans, where a study of the effects of high humidity and temperatures on refrigeration equipment, insulation materials, and application methods were made.

Active in the refrigeration and insulation industry for the past 11 years, Mr. George is a member of the American Society of Refrigerating Engineers.

In his new position, Mr. George will continue his contact with refrigerator cabinet manufacturers, and will devote much of his time to the development and improvement of the company's insulation materials.

**Nickel Saving Plan  
Is 'Door Opener'**

EAST PITTSBURGH—The common nickel, which symbolizes, for most people, ice cream cones, popcorn, peanuts, chewing gum, cigars, and magazines, is being taken out of the "chicken feed" class with Westinghouse's "Nickel Plan" for buying a refrigerator on a nickel-per-person-per-day basis, Westinghouse officials say.

The "Nickel-Saver," a novelty used as a door opener, showroom handout, or economy demonstrator, provides the heart of the plan. This folder has spaces for 20 nickels inside, and has on the back cover a table showing how many nickels per day are required to cover the purchase price of the various Westinghouse models.

Another table on the back cover shows how easily food savings will yield the nickels.

An "Econometer," a meter bank, and a food savings proposal form have been added to the "Nickel-Saver" to aid in the campaign.

To supplement these promotions, new radio shorts and a newspaper advertising series, plus a tie-in with the company's "Owners' Club Plan" have been made available to dealers.

A salesman's guide, part of the company promotion back of the drive, explains the new plan from the merchandising angle. A number of other sales helps have also been prepared.

**Canada Shuts Off  
Border Trade on  
\$99.50 Units**

BUFFALO—Duty-free importation into Canada of electric refrigerators costing less than \$100, supposedly permitted under the new Dominion tariff act, is being prohibited by the Canadian customs in this and other border cities, it became known last week.

No explanation of the ruling was made, but it was stated that in the regulations, handed down from Ottawa, several other items were listed as not to be passed duty-free.

Since enactment of the new Canadian customs act, a part of the reciprocal trade agreement with the United States, Canadian tourists visiting the United States have been allowed free importation of \$100 worth of purchases for personal and household use. Electric refrigerators, priced at \$100 or less, were passed without duty.

Many Canadians living along the border, it is reported, have been buying refrigerators for \$99.50 from dealers in Buffalo and Niagara Falls and carrying them back across the frontier in their cars, duty-free. Similar units are said to cost from 35 to 40% more in Canada than in this country.

The Canadian customs department, it is said, takes the position that the \$100 duty-free exemption clause applies only to small "impulse" purchases, such as souvenir items, as remembrances of their visit to the United States.

(At the Canadian customs office in

(Concluded on Page 20, Column 2)

**Indianapolis League  
Sponsors Display of  
Office Conditioners**

INDIANAPOLIS—To win over office building owners and managers, as well as the progressive type of business man, to general office air conditioning, the Electric League of Indianapolis is sponsoring a six-week display titled "The Correct Office," in the central business district here.

The two-room suite, which is air conditioned throughout, holds a composite group of attractive office equipment, fixtures and appointments.

Each of the rooms contains an air cooled type of portable room air conditioning unit of seven-tenths of a ton capacity, using ¾ hp. motors.

Area of the two-room suite is 430 sq. ft. It comprises a combination reception and secretary's room measuring 9 ft. x 17 ft. 9 in., and an executive's private office, 15 ft. 3 in. x 17 ft. 9 in. with a common ceiling height of 9 ft.

Shadowless illumination, indirect lighting, and Venetian blinds are part of the office equipment.

**Milwaukee Dealers Press Group Buying Fight;  
Hear Robinson-Patman Bill Discussed**

MILWAUKEE—Plans for combating group buying at wholesale prices, a reprimand from the president against trick merchandising methods, and an explanation of the significance of the Robinson-Patman Law were the highlights of the August meeting of the Wisconsin Radio, Refrigeration, and Appliance Association here.

As a result of complaints received by the association relative to employees of Milwaukee industrial plants obtaining wholesale prices for group purchases, the association is making an effort to obtain specific information to present to the Milwaukee Association of Commerce, President Frank W. Greusel said.

Members of the association were asked to present a statement of the cases about which they have knowledge, and to include in the statements these facts:

(1) The name of the industrial plant through which wholesale purchases have been made for plant employees. This information should show, if possible, whether the group purchases were made by the purchasing agent, or by whom.

(2) Article or articles purchased and in what quantity.

(3) Was this an isolated purchase

**Final Figures on  
Exports Reveal  
12% Gain in '35****South Africa and United  
Kingdom Are Our Best  
Foreign Customers**

WASHINGTON, D. C.—Exports of household electric refrigerators during 1935 totaled 119,853 units, an increase of 13,092 over the 106,761 units shipped to foreign countries during 1934, according to figures just released by the Bureau of Foreign and Domestic Commerce.

Dollar volume of 1935 household sales was \$9,354,482, compared with a total of \$8,736,591 for 1934 exports.

Sales of commercial refrigerating machines up to 1 ton fell off slightly during the year, totaling 20,820 units against 22,445 during 1934. Dollar volume of commercial business, however, was \$1,976,490, nearly equaling the \$1,979,652 total established in 1934.

Analysis of export figures shows that Union of South Africa continues to be the best customer United States manufacturers have. Shipments to this country last year were 18,388 units, compared with 17,652 in 1934, when it also led the foreign buyers' list.

United Kingdom, third in 1934 with 11,514 units, gained a notch last year with exports totaling 12,830 units, for a dollar volume of \$896,728. France dropped from second to third last year, with its 11,045 units slightly below the country's 1934 figure, 12,479. Dollar volume of French sales was also down considerably, totaling \$785,737 against \$979,247 in 1934.

Brazil, with exports totaling 9,212 units, was fourth in importance in the United States foreign refrigeration market, the country's 1935 figure being considerably up on the 8,113 units shipped there the year previous. Australia, with shipments totaling 5,738 units, was fifth; Canada, with 4,466 units, sixth; New Zealand, with 3,922 units, seventh; Argentina, with 3,789 units, eighth; Mexico with 3,447

(Concluded on Page 2, Column 1)

**More Than 200 G-E  
Homes Built in '36**

SCHENECTADY—With more than 200 homes completed and open for public inspection, General Electric's "New American" home building program is ahead of quota realization of a similar period last year, officials of the company report.

Last year approximately 600 such homes were erected in the United States.

General features of the program have been adapted to Canada by the Canadian General Electric Co., and 32 homes known as "General Electric Houses" have been constructed so far this year.

or is it a regular practice of the company?

The statements will be presented to the Commerce Association as soon as sufficient evidence is collected.

In opening the August meeting, President Greusel appealed to the members to adhere to sound merchandising methods.

"It has been my observation," he said, "that no member of this industry has ever been smart enough to outsmart the rest of the industry. A proposition which seems to have an appeal that will prove advantageous over competitors seldom provides anything more than very brief or temporary benefits, and, in the long run, usually injures the industry as a whole."

With the possibility that funds may be provided for the enforcement of the Robinson-Patman Act, and that a second bill proposing additional legislation would soon be proposed, H. L. Ashworth, executive secretary of the association, presented an explanation of the act and its possible effect on the industry.

One of the authors of the law, Representative Wright Patman, is contemplating a bill which would make

(Concluded on Page 20, Column 3)

## Britain & Colonies Biggest Importers, 1935 Figures Show

(Concluded from Page 1, Column 5)  
units, ninth; and Palestine, with 3,196 units, tenth.

Most notable gains were registered by New Zealand and Palestine, both of which tripled their imports of United States manufactured refrigerators during the year. New Zealand's total in 1934 was 1,296 units, and Palestine's only 1,019.

Most notable decrease in exports was in two European countries, Italy and Germany. Italy's refrigerator imports from United States dropped to 944 units, from a total of 1,828 in 1934; Germany's total dropped even more sharply, slumping to a mere 99 after a 1934 which saw 1,571 units imported from this country.

United Kingdom, leader in the commercial field in exports from this country in 1934, continued its performance last year with a total of 5,939 units. The 1934 figure was 6,429. France ranked second, in point of number, with exports from this country totaling 2,754 units; Belgium was third with 1,112 units, and Canada fourth with 847.

While most of the European countries offered smaller markets for export than in 1934, several others, hitherto relatively unimportant, began to evidence increased demand for American refrigeration equipment.

These included Spain, Sweden, Switzerland, Irish Free State, Palestine, Argentina, Brazil, China, British India, Netherlands India, Cuba, and Union of South Africa. Exports to the last country totaled 773 units, more than double the 1934 total of 344. Shipments to the other countries named were correspondingly higher.

## Former Railroad Man Finds 'Lookout System' Helpful in Selling

BIRMINGHAM, Ala.—A variation of "the old railroad system" keeps B. C. Kitchings, former train dispatcher and proprietor of Kitchings Electric Co., appliance store, supplied with plenty of electric refrigerator prospects.

As a dispatcher Mr. Kitchings, by constant communications up and down the line, could keep in touch with train movements and issue orders accordingly.

### 'Zones of Influence'

Now, as an electrical appliance dealer, he maintains "zones of influence" within various industrial plants of the city, especially the railroad offices and shops in which he was formerly employed.

He finds some man in these places who is willing to act as a lookout, turning in names of prospects, and receiving a small tip, about \$2.50 for every sale made through such leads.

### Postcards Name Prospects

These "key men" are supplied with postcards, and they mail prospect names to him—but he also keeps in touch with them by telephone and personal calls. And every now and then he invites them to a little party, to give them a chance to get a little more inspiration and himself a chance to express his appreciation for their services in digging up prospects and turning them over to him.

"The reason some dealers don't sell more refrigerators is that they depend on their own contacts alone," Mr. Kitchings says. "My plan is to broaden my contacts, by having scouts in the various plants where many persons work."

## Kelvinator Names Some of Winners In 'Keep the Ball Rolling' Contest; Campaign Called Best in History

DETROIT—Ten thousand dollars in prizes, 321 eight-day cruises to the West Indies, a Chrysler Six sedan, trips to the factory, and merchandise prizes are included in the 4,669 prizes which have made the Kelvinator contest to "Keep the Ball Rolling," which will close Aug. 29, bring in the most prospects and sales ever realized by Kelvinator in a summer campaign, reports S. C. Mitchell, director of advertising and sales promotion.

Open only to exclusive Kelvinator dealers, the contest is divided into five contests: a "Canvassers' Contest," in which the entrants' chances are dependent on the number of calls made; "Survey Contest," for commercial salesmen, based on the number of surveys for commercial installations; "Ball Rollers' Contest," for both retail and commercial salesmen, based on sales of domestic, commercial, or allied products; a "West Indies Cruise Contest," with 250 trips as prizes for leading sales records; and a "Wholesale Salesmen's Contest," based on the sales records of wholesale salesmen.

Since the campaign began on July 6, dealers have ordered half-million "How to Select" booklets, telling of the requirements for an electric refrigerator; and another half-million "The Requirements Are Met" companion pieces.

Each week, the winner of the Detroit trip draws the winning tickets from the large balls which hold the sales stubs for each contest. Salesmen may win either on luck, by a drawing, or on merit, by the number of sales at the conclusion of the contest.

Advertising back of the drive includes a series of eight 15-minute transcribed broadcasts on 125 stations.

### Havana Trip Winners

Those who have already won the trip to Havana on luck are: W. T. Fears, Houston, Tex.; H. Hunziker, Seattle; Howard E. Anthony, Los Angeles; J. D. Connor, Talladega, Ala.; Richard H. Gee, Fall River, Mass.; H. Duane McFarland, Danville, Ill.; R. L. Russell, Huntington, W. Va.; J. M. Jensen, Salt Lake City, Utah; M. F. Schwalm, Kansas City, Mo.; I. Donen, Rye, N. Y.

### Detroit Trip Winners

The Detroit trip has been won by: E. H. Miller, Davenport, Iowa; Fred Morgan, Beloit, Wis.; Bob Ward, Memphis, Tenn.; James F. Doyle, Philadelphia; Charles Z. Stough, York, Pa.

### \$50 Prize Takers

Winners of \$50 in the canvassers' contests for domestic retail salesmen thus far in the competition, include: C. Clark, Bradford, Pa.; Mr. Green, Kansas City, Mo.; R. W. Kyle, Upland, Calif.; Herman A. Stralow, Morrison, Ill.; and C. J. Dowe, West McHenry, Ill.

### \$20 Winners

In the same contest, the following have won \$20 prizes: L. K. Monds, Chattanooga, Tenn.; A. J. Kitchen, Huntington, W. Va.; J. W. Burke, Norwood, Ohio; L. B. White, Amarillo, Tex.; Robert S. Hutchinson, Kansas City, Kan.; Earl Elliott, Covington, Ky.; Charles M. Gilles, Grand Rapids; Wilbur C. Harris, Norristown, Pa.; Augie Tuor, Fargo, N. D.; H. O. Anderson, Minneapolis.

G. C. Blakesley, Pasadena, Calif.; William Carl Albany, N. Y.; Jones A. Douglas, Covington, Ky.; William T. Fischer, Akron, Ohio; F. W. Fowler, Detroit; E. W. Heintz, Akron, Ohio; Dwight M. Riley, Bessemer, Ala.; William Smith, Bristol, Conn.; Esther Thostesen, Grand Island, Neb.; Howard F. Weis, Buffalo.

Jude Baesman, Chattanooga, Tenn.; G. C. Blakesley, Pasadena, Calif.; Mr. Chambers, Chicago; J. Benson Egan, Logan, Utah; Earl Hall, Grand Rapids, Mich.; R. R. Kline, Lansing, Mich.; William Earl Klingbell, Sandusky, Ohio; M. Schoenberg, St. Joseph, Mich.; E. R. Seelbach, Buffalo; J. B. Speaker, Dayton. Joe Caron, Canton, Ohio; C. L. Clement, Shamrock, Tex.; C. L. Copeland, Amarillo, Tex.; H. B. Goggin, Roanoke, Va.; W. A. Harr, Selma, Ala.; W. S. McDevett, Durham, N. C.; Ernest Salerno, Ogden, Utah; F. J. Sherwins, Chicago; Roy Thompson, Moscow, Idaho; G. Wildman, Boise, Idaho.

Clarence H. Ambrose, Frostburg, Md.; E. Boyd, Houston, Tex.; O. G. Griffin, Buffalo; Meyer Cooper, Kansas City, Mo.; John E. Kohlman, Cincinnati; Hattie B. Lowe, Mt. Vernon, Wash.; R. C. Lyman, Buffalo; Delbert McKinley, Fort Wayne, Ind.; R. E. Rall, York, Pa.; and N. B. Tingle, Columbus, Ohio.

Every week during the campaign two Kelvinator wholesale salesmen also have their tickets drawn to win \$50 cash prizes and 25 to win merchandise prizes. Those who have been awarded the \$50 to date are: C. G. Walter, Los Angeles; Ted R. Cholan, Seattle; S. H. Harrison, Richmond, Va.; H. J. Mitchell, Seattle; C. B. DeCamp, Cincinnati; O. A. Reed, Birmingham, Ala.; C. J. Laufferweiller, Buffalo; Charles McElroy, Kansas City, Mo.; William Kerwin, Los Angeles; O. L. Easterbrook, Peoria, Ill.

## G-E Sales Analysis Shows Most Sales Result of Canvass

(Concluded from Page 1, Column 2)

pect list by way of the canvass; 214 were obtained from users. Only 116 of the names were originally picked up on the sales floor, 102 were leads obtained from friends, and a mere half dozen resulted from phone calls.

Value of evening calls is brought out strikingly in the survey, 549 of the sales being closed at that time. Afternoon and morning calls were almost equal in their effectiveness, with 241 of the sales being closed after lunch time, and 210 before.

More than 80% of the sales analyzed, results show, were paid for on the time payment plan. Only 188 cash sales were reported, compared with 812 purchasers who preferred to make payments in monthly installments.

Number of Sales ..... 1,000

### Where Closed

Home	683
Store	287
Husband's Office	30

### Buying Influence

Husband	122
Wife	281
Both	582
Outside	15

### Prospect Obtained

Canvass	562
Floor	116
Phone	6
User	214
Friend	102

### Method of Payment

Cash	188
Time	812

### When Closed

Morning	210
Afternoon	241
Evening	549

### Competition

Frigidaire	113
Westinghouse	159
Kelvinator	62
Norge	55
Coldspot	103
Electrolux	114
All others	127
None	267

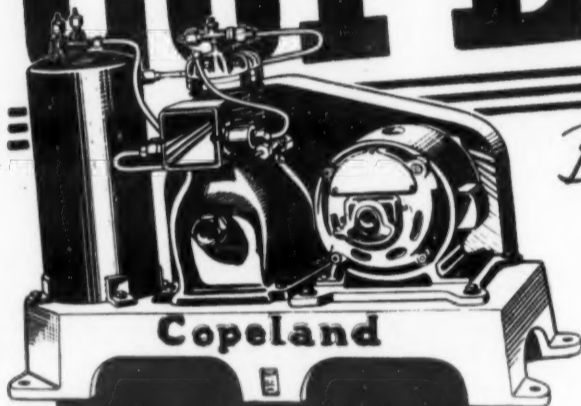
## Ranking Sparten Salesmen To Get Bermuda Trip

JACKSON, Mich.—A week's trip to Bermuda is the award which a group of Eastern division distributors' salesmen who built up high sales records selling Sparten refrigerators, are receiving from the Sparks-Withington Co. here.

Sailing from New York City aboard the Monarch of Bermuda the party will leave September 19, with E. T. H. Hutchinson, eastern sales manager in charge of the trip. A number of salesmen will be accompanied by their wives.

Before sailing, the salesmen will meet for breakfast and then attend the National Radio and Electrical Show in New York City, to inspect the Sparten radio and refrigerator display.

# Choose Wisely... and You'll Choose COPELAND



## Build Solidly for the Years Ahead!

This Great Precision-Built Line—Known Everywhere for Superior Performance—is the Big Opportunity of the Year for Far-Sighted Distributors

● BIG Years lie just ahead for commercial refrigeration. A huge replacement market is taking shape—and the demand for wider application of commercial refrigeration is becoming more insistent each succeeding year.

If you now distribute commercial refrigeration—and intend to stay in the business—it is very important to your business future that you represent a line of established reputation for superior performance.

Make absolutely sure that the customers you are selling today will be completely satisfied with your equipment in the years to come, and that the profits you make today will be permanent profits.

This great Copeland line is built to the highest precision standards in the industry. The dependable, trouble-free, economical performance built into every Copeland Unit has earned for this veteran line an enviable reputation. You can sell Copeland Commercial Refrigeration with complete confidence—in the quality, durability and performance of each unit—in the resources, facilities, experience and stability of the Copeland organization.

A few territories are available to those who can qualify for progressive distributorships. Write for particulars.

**COPELAND**  
REFRIGERATION CORPORATION  
Manufacturers of a complete line of Household and Commercial Refrigeration  
Holden Avenue at Lincoln • Detroit, Michigan

"Hell hath no fury like a woman scorned" is a motto that should be framed and hung in front of every refrigerator designer's desk.



More and more housewives are looking at the "pretty" finish on a new refrigerator—but saying to themselves: "Yes—but how long will it stay that way?"

PORCELAIN ENAMEL INSTITUTE, INC. 612 N. MICHIGAN AVE., CHICAGO

# PORCELAIN ENAMEL

## Dealers in Ford's Home Town Lose Business to Mail House & Can't Find Good Salesmen

By Winifred B. Hughes

DEARBORN, Mich.—Business lost to the refrigeration department of a leading mail order house, and a shortage of salesmen are major problems facing refrigeration dealers in this town which Henry Ford has made famous.

"Maybe it's because we're quite a ways from Detroit and the men don't want to come out here. Then too, most of them who don't do big things in the first 30 days they are with us get discouraged and give up," commented Tom Eurich, head of the refrigeration department of Daly Brothers, exclusive Kelvinator dealer.

In the spring of 1935, related Mr. Eurich, the company had approximately 20 members in its outside selling crew. It now has four. The situation exists, according to the department manager, principally because it has been impossible to keep the force permanently staffed.

### Sales Below Expectations

Summer sales for Daly Brothers have simmered along slowly, not quite up to the expectations of Mr. Eurich.

But just because business has been slower than usual doesn't mean that the refrigeration department of Daly Bros. is not an active profit-building activity. Even in the ordinary "off season," from November 18, 1935 to December 25, the company sold 59 refrigerators.

This little windfall was followed in February by the sale of \$2,100 worth of merchandise in six days, cash business. And when blustering March came along, the men sold 14 super Deluxe Kelvinators in nine days, Mr. Eurich stated.

### Electric Refrigeration News Helps Him Make Money

Salesmen hired by the Kelvinator dealership are put through a regular sales training course, and half-hour sales meetings are held each day.

"ELECTRIC REFRIGERATION NEWS has helped me make more money than anything else, and I have used your specifications issue as a regular Bible," Mr. Eurich declared.

### Housewives Don't Like Canvassing or Schools

On the whole, business is good in Dearborn, local dealers declare. This summer has been a good selling period, they believe, mainly because there has been no shutdown of the Ford factories here. When the men are laid off there is a decided drop in business, all dealers agreed.

"You can feel it within 24 hours, even if no one tells you, when the men are laid off," one dealer explained.

### Canvassers Not Liked

Two other factors which make the Dearborn market difficult are that housewives dislike to be canvassed, and they are indifferent to home service and cooking demonstrations.

"When you go around and ask:



### "NO WONDER HE'S GOOD He Trained with U.E.I."

U. E. I. students STAND OUT when they enter the Electric Refrigeration and Air-Conditioning Industry.

And no wonder... for they are trained along lines suggested by leading manufacturers. Leaders in the industry cooperate in making the course one that best serves the Electric Refrigeration and Air-Conditioning Industry as a whole.

U. E. I. students are SELECTED. Not every man who wants to enroll with us can do so. We pick men for their general qualifications and then give them complete training in every phase of Electrical Refrigeration and Air Conditioning work on all types of equipment. That is why the services of U. E. I. trained men are so satisfactory to employers.

Our FREE Placement Bureau can recommend a man to fill the position you have open, no matter in what part of the country it may be located.

UTILITIES ENGINEERING INSTITUTE  
404 N. Wells St. Established 1927 17 West 60th St.  
Chicago, Illinois New York, N.Y.

Are you in the market for an electric refrigerator, 99 out of 100 will say No," said Benjamin Rush, partner in the Winston & Rush jewelry store, Crosley and Norge dealer.

Established on a corner in the central business district of east Dearborn, the jewelry store dealership has been open only since April. Business in this short time, according to Mr. Rush, has been very good.

Nothing is being done at the present time in the line of extra promotional activity, but the company has planned special advertising campaigns to run in local papers after Labor Day.

### Store Traffic Important

"We have only four salesmen working on refrigeration and they do very little canvassing," said Mr. Rush. "When we first started out we had a man canvass for about three weeks, but we didn't get any business from it."

"I think that bringing customers into the store is far more important. When you get a prospect into the showroom, 98% of the sale is made."

Handling refrigerators and smaller electrical appliances as a side line is, for the jewelry concern (which has adequate floor space) a natural move, in Mr. Rush's opinion.

"It doesn't take any more rent, sales people, electricity, or overhead. You have those expenses anyway, so why not use your space to good advantage?"

### Caswell Sells 75% of Units Placed on Home Trial

Pushing their free-trial-in-the-home General Electric plan, Caswell, Inc.'s Dearborn branch store, managed by Don Rigley, is not running any other

special sales activity now. Paul Ramsdell, salesman, pinch-hit in the interview for Mr. Rigley, who was on his vacation.

Three-fourths of the refrigerators placed on trial in customers' homes result in sales, Mr. Ramsdell estimated.

"You can't beat giving the prospect a chance to try a machine out for getting her really interested in owning it," he declared.

Following the G-E plan the refrigerators are placed in the prospect's home for a two weeks trial period. Careful investigation into each prospect's credit standing is made before a refrigerator is shipped out, the salesman stated.

### Banishes Price Consciousness

Placing refrigerators in prospective buyers' homes on a trial basis proves an excellent method of banishing price consciousness, the Caswell representative asserted.

Price cutting enters very little into the refrigeration picture in Dearborn. It is responsible for some lost sales, Mr. Ramsdell said, but there is nothing to do except sell the prospect on the quality of the refrigerator you carry and make her see that big reductions and knockdowns usually mean less quality.

Caswell, Inc.'s recent promotions in the Dearborn area have included participation in both the Police Field Day and "Dearborn Day" activities, at which prizes given by the G-E branch store were good publicity.

The company now employs four salesmen, one of whom is a young woman who not only sells refrigeration from the floor but also makes contact and follow-up calls on radio and range prospects.

### Furniture Store Faced With Salesmen Problem

E. W. Schenkel, head of Yuergens Furniture Co., finds the salesman turnover problem one of the biggest faced by Dearborn refrigerator dealers. "The men seem to figure that Dearborn is just far enough from Detroit so that there is not much business here," he commented. Dearborn isn't exactly an easy

place in which to sell electric refrigeration, Mr. Schenkel believes, even though there is a comparatively small number of refrigeration dealers in the community.

"It is really a one-man town, and to outsiders it looks affluent, but believe me it's really hard to get money out of the people. They are awfully cautious when it comes to buying refrigeration."

The prevalent price-cutting evil mourned by dealers has always existed, and there doesn't seem to be anything that can be done about it, Mr. Schenkel stated. It is tough on the dealers, but it is also their own fault, he believes.

"When you make only \$5 on a sale it isn't even worth the trouble you took stocking the merchandise. It's the dealer's fault, yes, but when pressure is brought to bear on him, and the distributor contact men say 'Why don't you get your stock moving?', cutting prices is one way to get it moving. There doesn't seem to be any sales argument to meet it; you just have to lose some sales that way, and let it go at that."

### Price Cutting Not a Problem

In the opinions expressed by the majority of dealers contacted, however, price cutting is not among the major problems in the Dearborn selling area. There are some dealers who do it, and consequently take trade away from the others, but the greater number admitted that they are cutting their own purses by coming down below list price on refrigeration sales.

The Yuergens Furniture Co. has been dealer for Westinghouse refrigerators for two years, and has this year added Frigidaire to its lines. Handling Westinghouse exclusively for that period identified Yuergens with it in the suburban residents' minds, the dealer believes.

Two salesmen are employed at the present time on refrigeration sales. Manufacturers' mailing pieces and newspaper advertising are both used to stimulate sales. But no special promotions are being used to help August sales. May sales were exceptionally good, and the following two months satisfactory, the store head stated.

## EH&FA Announces 5% Discount Rate

WASHINGTON, D. C. — Electric Home & Farm Authority has announced that beginning Aug. 10 all commercial paper accepted by it covering the sale of electrical appliances will be purchased at an annual discount rate of 5%.

This means, the Authority stated, that the 5% yearly discount will be the only charge made on appliances purchased under EH&FA terms.

## Williams Tem-Clock Drive Nets \$2,225,000 Volume

BLOOMINGTON, Ill.—A retail sales volume of approximately \$2,225,000 on conversion-burner, boiler-burner, and furnace-burner units was the result of the Williams Oil-O-Matic Tem-Clock summer campaign, conducted from July 15 to Aug. 15.

Retail sales for the last day of the campaign totaled \$435,000.

No down payment, no monthly payment until Fall; low interest rates under F.H.A.; 12 to 36 months to pay; and an electric Tem-Clock for day-night temperature control free, were the points stressed in national advertising, direct mail, and window poster promotion.

## Refrigerators & Ranges Installed in U.S. City

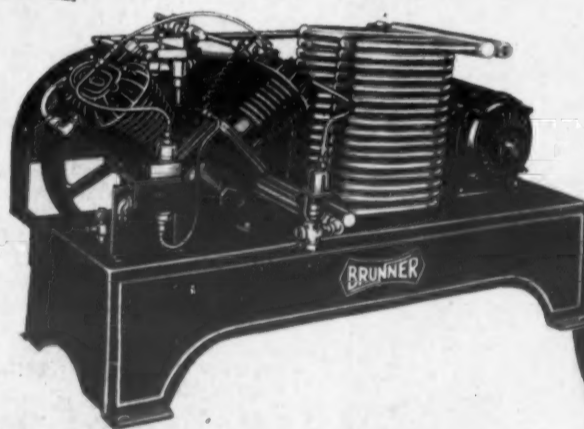
ATLANTA — Electric refrigerators, ranges, and hot water heaters are included in Uncle Sam's first city, "Techwood," recently opened to tenants.

The "city" covers 22½ acres and will house approximately 2,500 persons. Thirteen apartment buildings are included in the "city's" structures.

Rents range from \$23.47 to \$38.10 per apartment, including the electric bill. The modern kitchen equipment is causing much comment from housewives who inspect the settlement, reports say.

## BRUNNER UNITS ARE *Safe* TO HAVE AROUND

**BRUNNER**



**BRUNNER  
CONDENSING UNIT  
W-300**

A heavy duty 4 cylinder unit designed for large commercial installations. 3 H.P.—water cooled—quiet operating—endurance to spare.

Everything about Brunner Refrigeration and Air Conditioning Units points to safety. Throughout their entire construction they are "gas tight", permanently so. Cooling efficiency is equal to the heaviest demands. Oil sight gauges facilitate adequate lubrication. And of special importance, is the fusible plug in each receiver to insure safety in operation; as well as the two line valves which hold the gas in the receiver for safe shipment... Why not play safe with Brunner equipment? A point-by-point

check-up of the Brunner design—its safety, efficiency, endurance—tells why Brunner today is "The Fastest Growing Name in the Industry"... There's a Brunner cost-cutting model for every requirement from 100 lbs. up to 15 tons of refrigeration. Forty-seven condensing units, five compressor models, air and water cooled, in a range from 1/4 H.P. to 15 H.P. Full details await your request. BRUNNER MANUFACTURING COMPANY, UTICA, N. Y., U. S. A.

## BRUNNER CONDENSING UNITS and COMPRESSORS

## College Students Used by Wichita Dealer In Making Complete Survey of City; Census of Appliances Compiled

WICHITA, Kan.—"We are trying to find out where we should place our advertising, Mrs. Gentry. What newspapers do you read?"—with this as an "opener," college boys and girls, employed at 25 cents an hour, are building up a valuable prospect list for Shelley Electric Co., 123 South Main St. here.

To keep the survey informal, and to avoid frightening the prospect with any sales talk or direct queries, such questions as "Do you use ice?", "Do you cook with gas?", and "What time of day do you listen to the radio?" are lead questions used to obtain information.

The student canvassers have cards on which to indicate whether the housewife is a user, or prospect for a refrigerator, range, radio, washer, ironer, cleaner, and mixer, and the age of the appliances owned. Top half of the card is a coupon which entitles the prospect to a free gift when she presents it at the Shelley store.

During the six months that the survey has been in effect, a total of 4,499 filled-in cards have been turned into the dealer's office, and 3,500 women have brought coupons entitling them to a choice of the following gifts: ovenware, cake plates or pottery mixing bowls.

All names are listed in a ledger, and are classified under the name of the appliance for which they are in the market. Manufacturers' mailing lists are derived from this book, for direct-to-consumer mailings.

Requiring the women to bring in their gift coupons has, according to J. W. Jenner, president of the com-

pany, materially increased the sale of small appliances such as irons, fuse plugs, bulbs, and floor plug jobs, since the survey's inception.

When a housewife whose card is filed moves, or buys an appliance from Shelley's or from a competitor, her name is crossed out from the prospect page for that appliance; if a Shelley salesman closes an appliance sale from a survey lead, a small "s" indicates the fact in the ledger.

Through this friendly break-down, women are learning to know the Shelley salesrooms and to seek both merchandise and services voluntarily, Mr. Jenner states. No effort is made to rush them, or to force them to sign on the dotted line. In place of this, the company keeps in touch with its prospects through wholesalers' advertising and through occasional contacts at the store.

### Hust Heads Advertising Drive of Ice Industry

CHICAGO—H. G. Hust, president of the City Ice Co., Kansas City, has been appointed advertising director of National Ice Advertising, Inc., with headquarters in Chicago. He will be in charge of the cooperative national campaign in the interests of ice refrigeration.

Effective Sept. 1, Mr. Hust will resign his presidency with the ice association, and assume his new position. Guy W. Jacobs will continue as business manager of National Ice Advertising.

## Leonard Used to Keep Drinks Cool at 2-Day Auto Speed Trials

SALT LAKE CITY—While Capt. George Eyston of England drove his racer "Speed of the Wind" to set a 136-mile-an-hour speed record on the Salt Flats here in a two-day race against time, a Leonard electric refrigerator supplied announcers who broadcast the event with cooled drinks and food and obtained considerable publicity for the Boyle Furniture Co., Leonard dealer.

The refrigerator used for the convenience of the announcers during the two-day race featured in approximately 15 timed publicity announcements over the air. The tie-in stunt was the subject also of a special brochure mailed to 2,500 customers of the furniture company.

From this promotion approximately 1,000 telephone calls were received by the store's refrigeration department. The refrigerator was operated with the surplus electric power generated by the KSL short wave transmitter mounted on a broadcasting truck.

### Westinghouse Offers Range Folder

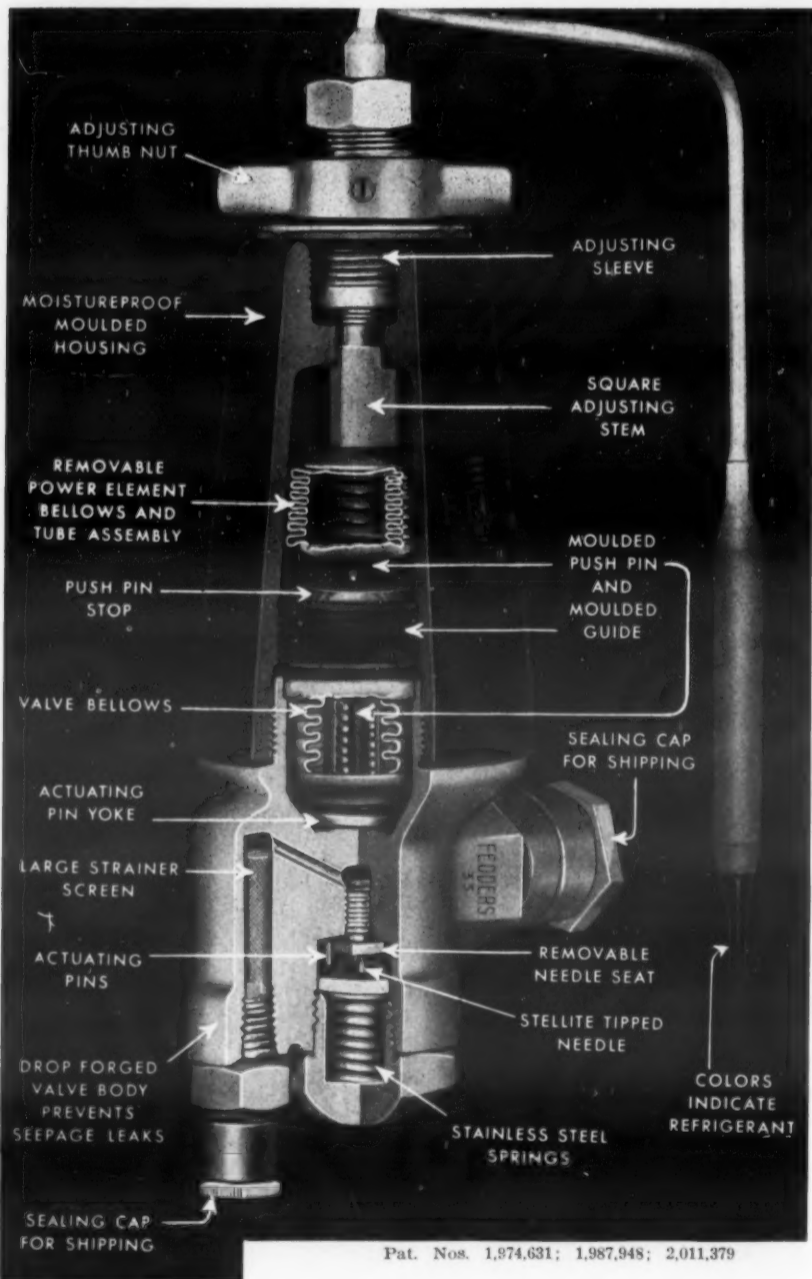
MANSFIELD — Containing illustrations of the nine electric range models in the Westinghouse Golden Jubilee line and features of each range, a two-page folder for customer mailing has been issued by Westinghouse Electric & Mfg. Co.

Titled "The Crowning Glory of Your Home," the folder pictures the Emperor, Regent, Viceroy, Dictator, Challenger, Ambassador, Crusader, Coronet, and Cardinal range models.

## United Kingdom and France Are Largest Buyers of U. S. Refrigeration Equipment During 1935

Final U. S. Bureau of Commerce Figures on 1935 Refrigeration Exports	Household Electric Refrigerators		Commercial Up to 1 Ton	
	Number	Value	Number	Value
Austria .....	345	\$ 24,849	120	\$ 11,893
Azores and Madeira Islands .....	11	1,058	2	856
Belgium .....	1,880	156,081	1,112	93,974
Bulgaria .....	13	954	...	...
Czechoslovakia .....	172	12,566	10	2,629
Denmark .....	5	437	61	7,288
Finland .....	176	12,931	147	16,233
France .....	11,045	785,737	2,754	226,765
Germany .....	99	7,352	61	9,248
Gibraltar .....	39	3,110	12	2,020
Greece .....	403	41,044	33	4,920
Hungary .....	14	1,048	20	1,268
Iceland .....	...	...	...	...
Irish Free State .....	364	30,107	327	29,956
Italy .....	944	79,965	489	42,488
Latvia .....	2	352	...	...
Lithuania .....	1	102	...	...
Malta, Gozo, and Cyprus .....	10	863	2	198
Netherlands .....	2,067	145,204	535	51,432
Norway .....	909	71,696	267	32,434
Poland and Danzig .....	25	1,753	4	620
Portugal .....	238	19,812	50	7,424
Rumania .....	91	10,834	5	485
U.S.S.R. (Russia, Europe and Asia) .....	37	4,476	1	390
Spain .....	2,162	173,764	739	81,544
Sweden .....	2,481	182,894	691	69,038
Switzerland .....	675	45,554	11	1,973
Albania .....	1	99	...	...
United Kingdom .....	12,830	896,728	5,939	359,577
Yugoslavia .....	77	6,830	49	6,748
Canada .....	4,466	242,756	847	103,331
British Honduras .....	32	2,851	...	...
Costa Rica .....	85	8,331	...	...
Guatemala .....	132	13,014	3	492
Honduras .....	152	15,463	22	5,275
Nicaragua .....	19	1,554	6	1,371
Panama .....	914	86,512	114	20,566
Salvador .....	65	5,723	20	3,209
Mexico .....	3,447	308,227	195	32,754
Newfoundland and Labrador .....	66	6,015	5	995
Bermuda .....	366	35,370	19	4,246
Barbados .....	120	9,851	2	686
Jamaica .....	109	13,415	7	1,186
Trinidad and Tobago .....	261	24,171	11	1,317
Other British West Indies .....	130	12,418	9	4,541
Cuba .....	2,060	194,692	342	47,333
Dominican Republic .....	193	18,224	8	1,186
Netherlands West Indies .....	651	61,887	50	7,968
French West Indies .....	164	15,858	8	918
Haiti, Republic of .....	233	22,844	8	1,610
Argentina .....	3,789	189,890	714	61,581
Bolivia .....	28	2,961	1	232
Brazil .....	9,212	691,191	700	82,910
Chile .....	743	60,877	96	13,099
Colombia .....	1,438	124,574	78	14,409
Ecuador .....	169	14,497	...	...
British Guiana .....	103	8,018	...	...
Surinam .....	46	4,629	...	...
Paraguay .....	39	3,386	...	...
Peru .....	680	67,741	48	6,412
Uruguay .....	239	19,206	148	14,511
Venezuela .....	1,491	134,949	37	6,436
Aden .....	62	5,055	2	574
Saudi Arabia .....	4	1,801	...	...
British India .....	2,500	227,059	399	47,852
British Malaya .....	1,409	134,007	58	8,019
Ceylon .....	391	33,204	19	1,664
China .....	1,746	158,095	142	20,536
Netherlands India .....	2,692	268,006	363	47,093
French Indo-China .....	837	81,248	5	1,510
Hong Kong .....	630	57,509	42	8,749
Iraq .....	2	200	...	...
Japan .....	214	21,745	107	14,740
Kwantung .....	204	14,985	16	2,711
Palestine .....	3,196	242,652	607	73,760
Iran .....	4	510	1	126
Philippine Islands .....	1,145	118,720	149	24,626
Siam .....	113	9,877	4	1,847
Syria .....	164	13,896	37	8,033
Turkey .....	1,545	123,896	174	27,109
Other Asia .....	15	2,665	5	1,219
Australia .....	5,738	363,152	129	11,503
British Oceania .....	10	1,132	2	1,301
French Oceania .....	48	4,504	...	...
New Zealand .....	3,922	318,217	433	46,883
Ethiopia .....	1	122	...	...
Belgian Congo .....	204	21,445	5	621
British East Africa .....	197	19,124	4	595
Union of South Africa .....	18,388	1,528,258	773	79,919
Other British South Africa .....	153	12,499	1	263
Gold Coast .....	206	17,476	2	106
Nigeria .....	98	10,592	...	...
Other British West Africa .....	9	1,101	1	136
Egypt .....	645	56,685	81	10,912
Algeria and Tunisia .....	2,268	172,756	237	24,749
Madagascar .....	83	7,283	...	...
Other French Africa .....	448	42,111	22	2,442
Italian Africa .....	145	12,836	2	118
Liberia .....	6	770	...	...
Morocco .....	783	59,403	27	3,496
Mozambique .....	444	36,916	21	1,995
Other Portuguese Africa .....	15	1,253	3	344
Canary Islands .....	239	20,124	6	597
Other Spanish Africa .....	172	12,248	1	109
<b>Total .....</b>	<b>119,853</b>	<b>\$9,354,482</b>	<b>20,890</b>	<b>\$1,976,490</b>

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The performance you get out of a valve is the result of the engineering that goes into it. This cutaway photograph takes the Fedders Model 33 Thermostatic Expansion Valve apart for you.

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## Important to Manufacturers of Display Refrigeration Equipment

The new LOXIT type Ace Hard Rubber Doors are attracting wide attention due to their new and valuable improvements in construction and design. • It will pay you to investigate LOXIT at once as the new doors are now available at no extra cost. Write to

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# Air Conditioning

## Knighton Sees Modernization Movement Boosting Conditioner Sales This Winter; Suggests Remedies for Sales Faults

By Phil B. Redeker

DETROIT—The widespread movement towards modernization of business establishments and the increasing tendency to plan and start such improvements before or at the beginning of a New Year should operate to make the market for year-round air-conditioning equipment very active during the coming Fall and Winter months, believes J. K. Knighton, sales manager of the Kelvinator air-conditioning department.

In answer to the question, "What will happen to air-conditioning sales with the advent of cold weather?" Mr. Knighton stated:

"The dollar volume of sales will go up in relation to the number of units sold, while the number of units will probably decline.

"Here's what I mean—the larger installations are planned far in advance of warm weather. Just as an industrial organization will plan structural and manufacturing changes during their busy season, but does not put them into effect until the slack season arrives, so will merchants and business men prepare for air conditioning this Fall and Winter.

"Naturally, this will be more evident in the case of larger organizations whose requirements run into greater tonnage.

### Smaller Business Also in Line

"While the smaller business establishment, such as the single shop retail store, will be more inclined to put off the actual investment until late Spring, the widespread modernization movement now noticeable throughout the country should help to step up sales in this bracket. Few aggressive business men neglect to make some sort of provision for air conditioning in any modernization plans on which they may be working.

"This will tend to maintain the so-called 'junior' market (installations of five tons or less), on a more equitable plane with the senior market during this calendar year.

"Room cooler sales, however, are made in nearly all cases as the direct result of a real hot spell.

A chart of the dollar volume of the three divisions of air-conditioning equipment, as Mr. Knighton sees the picture, is something as follows: senior air conditioning maintains a fairly constant curve throughout the year . . . junior air conditioning levels off in the Fall and through the Winter months with a gradual rise in late Spring through Summer . . . room

cooler sales drop off to low ebb in the Fall and rise almost perpendicularly the first part of July.

Air conditioning's sales curve will go up when more trained, full-time salesmen are employed; as the sales personnel gains more confidence in the value of its product; and as prices become more uniform, so that there will be "selling" of air-conditioning equipment rather than "bidding" for air-conditioning jobs.

### Engineers Should Not Sell

Too many dealers, thinks Mr. Knighton, have tried to get along with an inadequate sales force, and consequently they've failed to do much of a job.

"While competent engineering is the backbone of air conditioning, too many dealers have fallen into the error of trying to make an engineer do the functions of a whole air-conditioning department.

"What seems to happen in most cases is that the engineer fails to do much of a job as a salesman; and if he does, he seems to lose something of his ability as an engineer. There are exceptions, of course.

"The setup that seems to work best is one in which the engineer doesn't have to leave the office to take part in any of the preliminary sales and estimating work. This means, of course, that salesmen must be well trained in the matter of taking fundamental data for equipment and cost estimates.

"The engineer, however, should and must supervise the salesmen's efforts as far as recommendations and specifications are concerned.

"But when an engineer goes out with a salesman he is likely to consider the proposed installation too much in the light of compressors, ducts, insulation, etc., rather than in terms of what the installation will do. Thus, when the question of cost arises the prospect is likely to think of this purchase in the terms of the actual equipment he is buying, rather than the results which are to be produced, and consequently the sale will very likely be lost, as air conditioning equipment as far as bulk is concerned isn't very impressive."

Greatest deterrent to sales, in Salesmanager Knighton's opinion, is the salesman's own lack of confidence in the worthwhileness of his product, caused by his own ignorance of the real sales story behind air conditioning.

"To sell air conditioning, a salesman must first be thoroughly sold on it himself, and he must have a thorough knowledge of its benefits for the prospect.

"Few prospects have any basis for estimating the value of air conditioning. It's a new venture for most of them, and when the salesman fails to put across an enthusiastic story about its benefits, and agrees that the price is high, the sale is killed.

"The men who will sell the greatest volume of air-conditioning business this year will be those individuals who are selected because of their ability to call on business men and talk to them in terms of big figures—individuals who are accustomed to make sales running into hundreds of dollars, and who have sufficient imagination to interpret the value of air conditioning to any business.

"Likewise, the dealers and distributors who will be most likely to succeed are those who select salesmen on the basis of their ability to talk to the various types of business men they want to sell.

"In other words, 'grade your salesmen.'"

## Seed Company Places 2nd Order for Conditioners

NEW ORLEANS—Discovering that seeds stored in an air-conditioned room maintain a higher state of germination, the Reuter Seed Co. has placed a duplicate order for air-conditioning equipment with the Equitable Equipment Co., Westinghouse dealers.

Owners of the company estimate that through the use of the equipment thousands of dollars for cold storage fees will be saved annually in the maintenance of temperature and humidity best suited to so specialized a product.

## Servel System First In Independence, Mo.

KANSAS CITY—First air-conditioning installation in Independence, Mo. is that recently completed in the George C. Carson Funeral Service Co. by the Paris Refrigeration Sales, Servel distributor here.

Equipment consists of one 7½-hp. Servel machine unit, two suspended-type air conditioners, and five Servel floor-type units. The machine unit and suspended-type conditioners are installed in the basement of the building with distribution of air to the chapel by duct. Floor type units are located in the morgue, business office, living room, bedroom, and in the kitchen of the funeral home.

The system is of the selective type; the entire capacity of the machine unit can be directed to air conditioning the chapel during funerals, while at other periods, it may be switched over to cool the office and living quarters.

With a seating capacity of 100 persons in the chapel, temperatures of 76 to 80° F. are being maintained with outside temperatures of 95 to 110° F., according to Mr. Paris.

## Conditioned Air Used To Preserve Movie Film

CULVER CITY, Cal.—The movies you see as well as the theaters in which you see them will soon be air conditioned, if a movement started at International Cinema, Inc., gains recognition in the film industry.

International Cinema has installed a special Westinghouse air-conditioning system in its film drying laboratory for drying films under adjusted temperature and humidity conditions.

After passing through several developing tanks the film is dried in carefully controlled atmosphere. Experience has shown that without properly conditioned air the film dries improperly and soon becomes brittle, shortening its useful life after it leaves the studio.

The installation, made by Gay Engineering Corp. of Los Angeles, requires about half the refrigeration capacity of conventional installations for areas of similar size. The two Westinghouse compressors are direct-connected.

Several other companies are reported to be negotiating for similar drying rooms for films.

## Utility Engineer Traces Progress in Chicago

CHICAGO—With its air-conditioning load increased over 75% in three years at a profit gain of over half a million dollars, the Commonwealth Edison Co. here considers the establishment of its special air-conditioning department in 1933 a major step in business building. "The market for air conditioning in this city has just begun," William P. Rock of the utility told members of Great Lakes Power Club at a recent meeting.

Prior to 1933 all air-conditioning installations in Chicago totaled a 28,000-hp. connected load, Mr. Rock stated. Installations in 1933 added 2,700 hp. In the following year the utility added 6,800 hp. to its lines.

New installations in 1935 brought 5,461 hp. to company output. Totaling 48,942 hp., the load at the end of the year represented 934 separate installations.

"A survey of customers' bills showed us that the annual income per horsepower from air conditioning averages \$12," said Mr. Rock. "Our yearly income from this new industry has been raised to \$600,000."

### 20 QUALITY FEATURES

#### (No. 17)



Servel's Forged Bronze Shut-Off Valves, with Gasketed Caps, Operate Smoothly and Afford Permanent Assurance Against Annoying Leaks.

## RISE CURVES . . .

Increased volume and increased profits characterize the 1936 reports of Servel distributors in every part of the country. Business in some quarters has risen more than 200%—in scores of cities more than 100%. Almost without exception, gains over 1935 have been substantial . . . A dependable product, combined with effective merchandising co-operation from the factory, is the distributor's best assurance of satisfactory profits as well as volume . . . Franchises on commercial refrigeration and air-conditioning products may be available in your area. A letter or a telegram will bring details.

# SERVEL

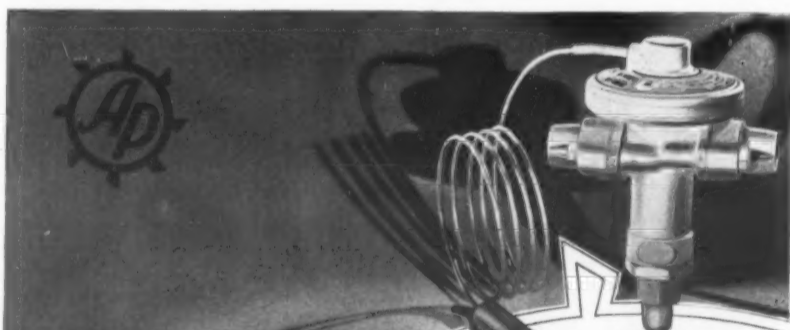
COMMERCIAL REFRIGERATION

SERVEL, INC., Commercial Refrigeration Division EVANSVILLE, IND.

This modern 33-acre plant is the home of Servel Commercial Refrigeration and the world-famous Electrolux, the Servel Gas Refrigerator



There is no Substitute for Experience



## EXPANSION VALVES

### ABSOLUTE PROTECTION AGAINST SERVICE FAILURE

Mechanical failure of expansion valves to function under varying conditions is, directly or indirectly, responsible for the great majority of service troubles.

You can eliminate this costly hazard by specifying A-P Thermostatic Expansion Valves on every application of thermostatic control.

A-P Thermostatic Expansion Valves may be installed in any position, or in any temperature, even though higher or lower than the bulb.

Send coupon below for all the facts.

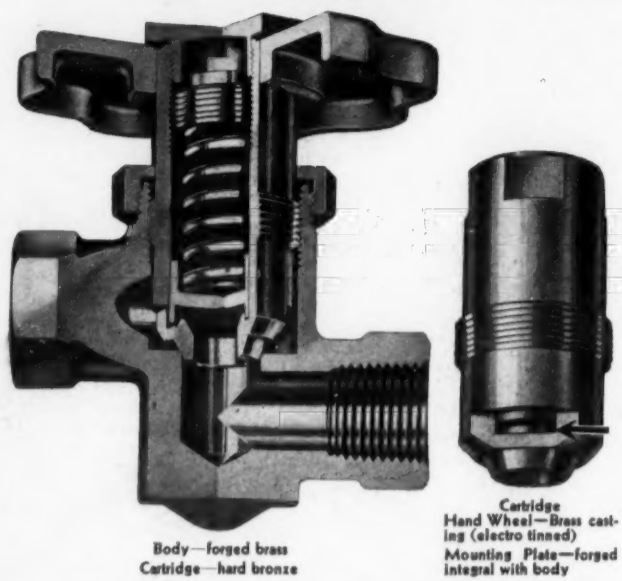


AUTOMATIC PRODUCTS CO.  
121 Broadway Dept. E2  
Milwaukee, Wisconsin

NAME  
ADDRESS  
TOWN STATE

Model 210, designed particularly for commercial applications; furnished with flared nuts. Complete range of models, 1 to 15 tons FREON.

## Mueller Brass Co. PRESSURE RELIEF AND EMERGENCY VALVE



Body—forged brass  
Cartridge—hard bronze

Cartridge  
Hand Wheel—Brass casting (electro tinned)  
Mounting Plate—forged integral with body

This pressure relief valve is set at factory to relieve at pressure specified by code.

In case of fire or other emergency when the pressure in the system is increased to the pressure at which the valve is set, the refrigerant will be automatically discharged to the outside atmosphere. In case of threatened emergency the refrigerant may be discharged manually by turning hand wheel. Opening the valve manually does not affect its adjustment.

These valves are supplied with a Duprene disc or lead alloy disc. The Duprene seat is recommended when the valve is used in Freon or SO<sub>2</sub> systems, the lead alloy with methyl chloride. Valves are furnished as follows:

- A-13518 1/2" F. P. T. (Duprene Seat)
- A-13458 1/2" F. P. T. (Lead Seat)
- A-13533 3/8" F. P. T. (Duprene Seat)
- A-13534 3/8" F. P. T. (Lead Seat)

The pressure relief valve is one of the latest additions to our complete line of valves, fittings and accessories for mechanical refrigeration.

Write for information

### MUELLER BRASS CO.

Port Huron, Michigan

## Portable Unit Made for Operation of Train Air Coolers on Stopovers

MILWAUKEE—A new portable unit for charging railway car batteries and running the air-conditioning equipment while the cars are standing in stations has been developed by Harnischfeger Corp. here.

First of the new units was used on a special tourist train on the Chicago, Milwaukee & St. Paul railway, where passengers made the Pullman cars their hotel headquarters during stopovers. As the train traveled west they enjoyed air conditioning during layovers as well as on the regular run.

Powered by a Ford V-8 motor with electric starter, the new unit is mounted on a flat truck with ball-bearing wheels. Furnishing 15 kw. nominal 32-volt direct current, the unit is capable of operating air-conditioning equipment for three cars at a time. Completely enclosed carriage suits it for outdoor service in all weather.

The equipment is now in use by the C. M. & St. P. at Star Lake and Minocqua, Wis., for air-conditioning railway cars prior to departure and for battery charging service.

## Boger to Manage Dayton Cog-Belt Sales in East

PHILADELPHIA—H. L. Boger of the Dayton Rubber Mfg. Co. was recently transferred to the company's industrial division, where he will be in charge of cog-belt sales for the Philadelphia territory with headquarters at 928 City Centre Bldg., 121 N. Broad St.

Mr. Boger has been with Dayton Rubber for 12 years, and prior to that time was employed by two other rubber companies in mechanical and production divisions.

## La Crosse Co. Organized to Sell Conditioners

LA CROSSE, Wis.—Valier Sales Co., Fourth and State Sts. here has been organized to distribute air-conditioning equipment, radios, and accessories for the territory covering a 100-mile radius in this district. R. R. Valier heads the company.

## Cool Patrons Buy Hot Hamburgers



Before the Hamburger Inn on Main street, Richmond, Indiana, installed the Frigidaire conditioners (one of which may be seen in the upper right hand corner) no crowds like this ever invaded the place in summer.

## 5-Cent Hamburger Inn's 'Loss' Months Made Profitable by Comfort Cooling; Owner Now Conditioning His Home

RICHMOND, Ind.—Prior to 1934 the Hamburger Inn on Main St. here did one whale of a business for nine months out of the year. Owner C. A. Winzer found that just enough people didn't drop in for one of the Inn's famed nickel hamburgers to make business profitable in the other three hot summer months.

H. R. Marlatt of Electric Service, Inc., Frigidaire dealer, told Mr. Winzer that there was an answer to his problem. The proprietor of Hamburger Inn listened, and finally bought the Frigidaire air-conditioning system which Mr. Marlatt recommended.

To all who want to know, Mr. Winzer will now testify that the air-conditioning system which cost around \$2,800 paid for itself in two months; that on week-ends alone his patrons will consume as many as 5,000 rolls and 150 lbs. of hamburger; and that on a good hot Saturday (Richmond is a "Saturday night" town) people have at times stood in line outside waiting a chance to get into the air-cooled haven.

So pleased and impressed was Mr. Winzer with the operation of the air-conditioning system in his store that he is now having his own home equipped with a year-round Delco-Frigidaire conditioner being installed under Mr. Marlatt's supervision.

Equipment which keeps the Hamburger Inn patrons in cool comfort consists of two 3½-ton suspended-type conditioners served by 3½-ton condensing units. This equipment serves to condition a food-serving establishment with a capacity of 100 persons, a floor space of 1,500 square feet in which eight employees work.

The conditioners are mounted off the ceiling in each of the two rooms. Compressors are of remote installation.

A problem common to all food-serving establishments, and particularly one in which hamburgers are being fried almost continuously, is the great amount of heat generated by the frying table.

This problem, was solved to some extent in the Hamburger Inn by constructing a glass enclosure around the frying table, and venting as much as the heat as possible to the outside by means of a large stainless steel flue (see picture).

Air conditioning equipment isn't all that Mr. Marlatt has sold the Hamburger Inn. Other refrigerating equipment—a walk-in storage cooler, reach-in food storage box, a beer coil box and a huge bottle cooler—has brought Frigidaire sales in this one establishment to a total of almost \$8,000.

Because of the tremendous load imposed on the beer cooling system during rush hours, especially Saturday afternoon and night, a somewhat novel idea has been employed to obtain extraordinarily low temperatures in the coil box. Instead of the conventional sweet water bath, a mixture of one third Prestone (such as is used in automobiles for anti-freeze purposes), and two thirds water is used. This makes possible the maintenance of a temperature of 28° F. in the coil box.

The Hamburger Inn is only one of several sizeable air-conditioning and commercial installations which Mr. Marlatt has made in Richmond. Other air-conditioning jobs include the following:

The second National Bank; Hudson's Cafe; four offices; sleeping quarters in two homes; and two large storage rooms in the plant of the Harris Produce Co.

"Air conditioning is getting easier to sell," says Mr. Marlatt. "We're looking forward to a big year in 1937."

## Subsidiary of National Radiator to Enter Conditioning Field

NEW YORK CITY—National Air Conditioning, Inc., has been formed as a subsidiary of National Radiator Corp., it became known last week. In addition to taking over the oil heating division of National Radiator the new company will extend its activities to air cooling and air filtering.

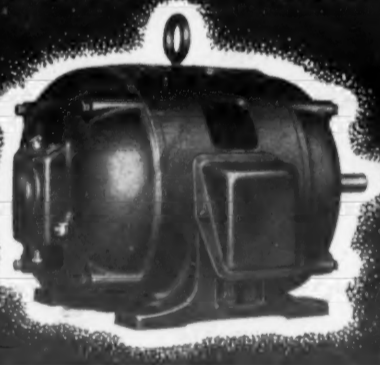
Vice president and general manager of the new organization is Charles P. Culbert, formerly sales manager of the oil heating division of National Radiator. Assisting him as vice president in charge of engineering is L. N. Hunter.

## Taking Care of the Frying Table Heat



In the back left hand corner is the frying table at the Hamburger Inn, cut off from the conditioned area by glass partitions. The stainless steel flue also helps to remove the heat caused by the cooking operations.

Easy to CLEAN outside



Keep Themselves Clean  
INSIDE

Century Polyphase Motors keep themselves clean inside in the presence of dust that will not harden with heat nor solidify with high humidity... They are easy to keep clean outside... They start quietly—run quietly—and are remarkably free from vibration.

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**Century**  
MOTORS

SIZES UP TO 600 HORSE POWER

## World Congress Papers Deal with Air-Conditioning Research

### Air Conditioning in Damp Climates

By H. Behringer

N. V. Comprimo, Amsterdam

Due to the drying of air requiring much energy, conditioning plants in damp climates have to be of bigger capacity than in ordinary climates. So as to limit the size of the plant, one might think of working with a reduced amount of outside air intake and a high percentage of recirculation air, wherefore it would be useful to have the rooms properly insulated and made air-tight. This is however contrary to the habits of living and the construction of the buildings in the countries concerned. The above practice might perhaps be applied to stores, theaters, etc., but so far it has been found impossible to introduce it in the field of private residence conditioning.

Instead of aiming at a reduction of the air volume to be treated, the problem may be attacked from the other side: developing economical plants for the treatment of a large air volume. Even when the inside temperature and humidity conditions are not quite as would be theoretically required, a plant delivering into the room a very liberal amount of properly treated outside air, without any recirculation, would probably give the better overall comfort.

For this purpose, all air conditioning systems are not equally suitable. Those in which the drying of the air is obtained in an indirect way or under unfavorable conditions are of course at disadvantage. To this category belong all refrigerating machines, whether mechanically driven (compressors) or using heat (steam jet and absorption machines). Direct methods for air drying, in principle, are more advantageous. Here also a distinction can be made between mechanical systems (open cycle air machine) and heat using systems (elimination of humidity by absorbents). In each of the above two categories, the heat using systems are the more economical in running.

### Air Conditioning with Ice

By H. de Saugy, France

The importance which must be given to the pressure of the water vapor saturating the air, and the need for bringing it in as one of the essential characteristics of the gasiferous mixture (air and water vapor) in the same measure as the temperature, the relative humidity and the velocity of the air.

Ice constitutes an accumulator of cold, at constant temperature and variable delivery, which is adapted perfectly to air conditioning requirements.

Various possibilities exist for using ice as the cooling source:

Direct methods: the air is conditioned by direct contact: 1) with the ice, 2) with the ice melting water.

Indirect methods: the air is conditioned by means of: 1) an ice-cooled liquid, 2) an appropriate ice-cooled surface.

Description of some typical plants using ice in its different forms as the source of cooling.

The following resolution is suggested: that a closer cooperation between technical men and ice manufacturers may more rapidly generalize the use of ice for air conditioning purposes;

— That an active propaganda campaign be started so as to familiarize the public with the progress accomplished in the use of ice.

### Air Expansion Cooling For Railroads

By J. van Stappen

The Netherlands Railways

The Netherlands Railways have installed in two two-wagon electric trainsets on the line Rotterdam-Hook of Holland a cooling installation system Lebre, working on the air expansion principle.

Till now it was not possible to use the expansion of air in an economic way, the conventional type of air machine requiring too much power. In the Lebre system there is no successive compression and expansion. These processes are performed in a combined and continuous manner in the "Lebre heat-pump" which requires only a rather small power.

A great advantage is that the medium is nothing but air, which is heated in winter operation and cooled in summer operation.

### Thermodynamics in Air Conditioning

By E. Altenkirch, Germany

Next to the cyclic processes connected with work, there are thermodynamic processes where work does not come into play.

This applies for instance to those heat exchange processes which have such particular importance in cold air machines, in the Linde liquefaction process, and in absorption machines. The working substance at some point of the cycle is put into heat exchange with the same working substance at another point of the cycle.

There exist analogous processes of exchange of matter which also result in approaching the cycle to reversibility and which, due to small partial pressure differences, allow of effecting the exchange of considerable amounts of matter.

It can be shown that all air conditioning operations may be performed by means of almost reversible open cycle processes with exchange of heat and matter—without any work—requiring the use of very simple apparatus only.

As illustrative examples, the separation of the moisture of the air by condensation, the drying of air and its cooling by a cold multiplication method are discussed more in detail.

### Economic Barriers to Refrigerated Air Conditioning

By B. C. Oldham, Great Britain

Manufacturers and potential users of refrigerated air conditioning are agreed upon its desirability; they are equally in agreement that the disproportion between the cost of the

frigorific and the calorific, the B.t.u. of cold and the B.t.u. of heat, is far too great, both in the cost of the necessary equipment and the running costs.

While this condition lasts, refrigerated air conditioning must remain under a severe handicap in the temperate climates north of, say 40° North latitude, while even in the tropical and commercially developed cities of British and Dutch India the installation of refrigerated air conditioning is mainly for industrial purposes; comfort cooling with the aid of refrigeration is still conspicuous by its absence.

For the home and the office or "coldspot" cooling in the form of air-conditioned enclosed beds and air-conditioned corners of offices have recently been introduced, but these must be considered as being as far removed from finality as the electric bowl fire is from central heating.

The technical development of refrigeration has become stereotyped; the past decade or duodecade has witnessed a vast transformation in the refrigerating industry, but this has been mainly development in controls, sizes and sales.

In the air conditioning field the refrigerationist is a sub-contractor to the heating and ventilating engineer, the latter having the ear of the architect. Adaptation of standard refrigerating equipment results, and air conditioning accounts for about 30% of refrigeration enquiries but only about 3% of the orders. The large excess of cost of a refrigerated air conditioning scheme over that of ventilation, even when air washers are included in the latter, usually decides the client to postpone the refrigeration section indefinitely, but to make provision for it in the layout of the scheme.

Unprogressive legislation also militates against refrigerated air conditioning, many local authorities taking

a lead in framing their bylaws from the London County Council, who make no allowances for the benefits of washed or refrigerated air over that of raw fresh air. There is a large margin below specified fresh air quantities before the minimum healthy quantity is reached, in which license should be permitted the air-conditioning expert. The compression machine with surface heat interchanger; refrigeration by evaporation of the mother liquor; evaporized compressed air through turbo-compressors; and dry surface coolers; all have their particular field inside which they are desirable, and outside which they are uneconomical. A combination of heating and cooling installations appears to be the ultimate solution.

### The Use of Calcium Chloride Brines

By Pinson

S. A. des Glacieres de Paris

The reaction of calcium chloride brine can be either acid, neutral, or alkaline. Never operate with acid brine.

In a new refrigerating plant, comprising new, galvanized ice tanks and cans, only neutral brine should be used, and this for as long as the zinc coating remains on the cans. In every other case, the calcium chloride brine should be alkaline.

The nature of the water is also an important factor; it should be as pure as possible. Seleniferous water is to be avoided.

For checking, with a view to corrosion control, whether the brine is acid, neutral or alkaline, use can be made of color indicators. In this connection, hints are given concerning the use of phenolphthalein and methyl orange.

# McCord

*Refrigeration and Air Conditioning*

## PRODUCTS

CONDENSERS

COMMERCIAL EVAPORATORS

DOMESTIC EVAPORATORS

COMFORT COOLERS

MARKET COOLERS

AIR CONDITIONING SURFACE

UNIT HEATERS

BLAST HEATING SURFACE

CATALOGS ON REQUEST

McCord Radiator & Mfg. Co.  
DETROIT, MICH.

**To protect YOUR BUSINESS and profits, we are telling this story to the public and to your large-building prospects**

### WHAT IS "AIR CONDITIONING"?

To be sure you're getting true air conditioning, check these services before you buy:

**"SUMMER AIR CONDITIONING"**

1. Controls and installation of the air conditioning system.
2. Controls the air conditioning system.
3. Controls the air conditioning system.

**"WINTER AIR CONDITIONING"**

1. Controls and installation of the air conditioning system.
2. Controls the air conditioning system.
3. Controls the air conditioning system.

There are on the market many appliances which claim to be air conditioning, but which are not. The true air conditioning is a process which does not depend on the use of any particular appliance. It is a process which is controlled by the air conditioning expert. The true air conditioning is a process which does not depend on the use of any particular appliance. It is a process which is controlled by the air conditioning expert.

This advertisement is sponsored jointly by the Air Conditioning Manufacturers' Association and by Kinetic Chemicals, Inc.

INADEQUATE, misrepresented equipment can destroy public faith in air conditioning.

Appliances which are called "air conditioners," yet which do not meet the minimum requirements of true air conditioning, promise the buyer more than can be fulfilled. However efficiently they may serve their limited purposes, they lower public confidence in and appreciation of true air conditioning—injuring your business and ours.

Because of the tremendous sales potential in air conditioning, it is essential that the public should not be confused and disappointed by equipment which does not provide the values justly expected from a product called an "air conditioner."

We invite your cooperation in our efforts to educate the public in the true meaning of air conditioning.

This advertisement is sponsored jointly by the Air Conditioning Manufacturers' Association and by Kinetic Chemicals, Inc.



### Installing ELECTRIC REFRIGERATION

**Quicker Work:** Wolverine Seamless Copper Tubing saves fabrication time. Its uniform temper permits easy bending.

**Better Work:** Deoxidized, Dehydrated and solder-sealed tubing from Wolverine prevents trouble. Reduces service calls.

**Approved:** Made to A.S.T.M. B-68-33 Specifications.

**Stocks:** Ample stocks at your jobbers.

**Wolverine Tube Co.**  
1411 Central Ave.  
Detroit, Mich.

### SCURLOCK — KRISPERETTE — For All Refrigerators

- Instant Visibility—Satisfaction
  - Prevents Dehydration—Always Fresh
  - Twin Covers—Convenient
  - KRISPERETTE—stores all fresh vegetables, meats, fish and fowl
- All refrigerator requirements solved—Scurlock units equip them completely.



Entire contents removed without taking unit from shelf.  
New Profits—start pushing  
For Details—WIRE or WRITE  
**SCURLOCK KONTANERETTE CORP.**  
1477 Merchandise Mart - Chicago

THIS MESSAGE IS BEING BROUGHT TO THE ATTENTION OF 698,972 PEOPLE THROUGH THE FOLLOWING PUBLICATIONS:

Time .....	625,292	Architectural Forum .....	21,713
Chain Store Age .....	15,123	Federal Architect .....	2,300
American Restaurant .....	12,437	Building & Building Management .....	2,462
Retailing .....	6,499	Building Modernization .....	13,146

TOTAL CIRCULATION 698,972

## Commercial Uses

### Evaporative Condensers & Forced-Draft 'Diffusers' Used in New Detroit Dairy Plant

By Phil B. Redeker

DETROIT — Marked savings in operating costs plus improved efficiency in operation are claimed for the installation of Carrier evaporative condensers, and a Carrier floor-type forced-draft cooling unit for an ice cream hardening room, which installation has recently been completed by Atmospheric Control Co. for the new plant here of Shedd Products Co., dairy products firm.

Now being completed in the retail "Dairy Bar" operated at the plant is the installation of an air-conditioning system in which excess low temperature brine from the plant's refrigerating system will be used as the cooling medium in a Carrier "Weather-maker."

There are three evaporative condensers installed, one for each of the three 9x9 Frick ammonia compressors (each direct-connected to a 100-hp. motor), which furnish refrigeration for the dairy plant.

According to H. C. Levine of the Atmospheric Control Co., each evaporative condenser uses water at the rate of only 2 g.p.m., whereas with a conventional type condenser, even where a cooling tower is employed, condenser water consumption for each of the machines would be at the rate of 350 g.p.m.

Series 9-L Carrier evaporative condensers are used. Air is taken into the bottom of the condenser cabinet, and is discharged upwards counter to the flow through the coils, and to the outside through ducts at the top of the cabinet.

Inside the condenser cabinet a fine jet of water is directed against a target. The water is atomized upon impact, and the spray is carried across the coil, wetting the surface, from which is obtained the "evaporative" cooling effect. An automatic water valve keeps the water pressure constant.

As the air intake is from the outside, the Carrier evaporative condenser can be used as an air-cooled condenser during the winter time. A solenoid valve hooked up to a thermostat cuts out the water supply for atomization purposes when the outside temperature gets down to 35° F.

The 5x5-foot air intake, which is hooded and screened to prevent waste matter from entering the condenser, brings air into a big cement chamber which forms a base for the three condensers. Blowers then take the air up through the condenser chamber and discharge it through outlets which are cut into the large glass

windows which line one wall of the engine room.

Arthur J. Borck, operating engineer for Shedd Products, reports that during the long heat spell in July head pressures never rose above 165 lbs. During several hot days in August readings taken from thermometer wells by H. V. Beggs, engineer for the Atmospheric Control Co., showed condensing temperatures maintained at an average of 74 to 76° F.

Engineer Borck is very pleased with the operation of the evaporative condenser, thinks operating costs will be lower than with the usual type of condenser used in such an installation, although he has no figures as yet to determine this point. It will be a question of power against water costs; each evaporative condenser has a 5-hp. blower motor, and a ¼-hp. motor for a water pump. Water consumption, however, can be cut to less than 2 g.p.m.

Shedd Products Co. officials decided to install the Carrier floor-type "cold diffuser" for the ice cream hardening room when they learned that the savings in dimensions it would entail over the construction of a hardening room with ceiling piping and baffling, would be great enough to make a materials and labor saving that would just about pay for the cost of the Carrier units.

Two Carrier 15-L-7 diffusers are installed, and maintain a room temperature of -24° F. Under these conditions 3,000 gal. of ice cream, on the average, are hardened overnight. The hardening time could be cut down to less than 8 hours if desired.

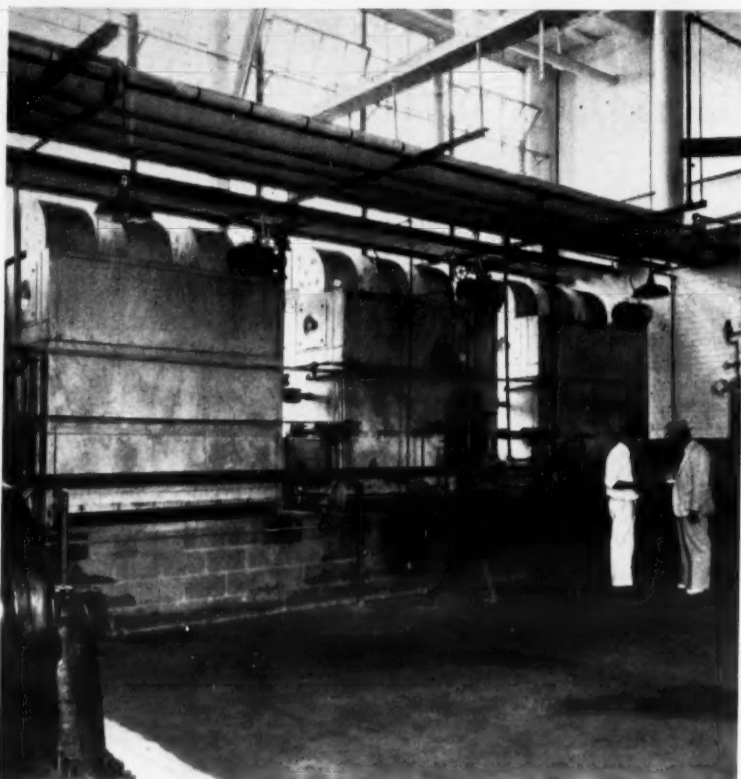
Two other factors which induced Shedd Products to install the diffusers for the hardening room where cleanliness and appearance. As can be seen from the picture, there are no frost or drippings apparent.

The air conditioner for the attractive, pine-paneled dairy bar consists simply of a Carrier "Weathermaker" in which excess brine from the plant refrigerating system is used instead of a direct expansion refrigerant. Distribution of the conditioned air to the dairy bar is through grilled outlets in the wall.

In the cooling cycle of the system a problem presented itself in the matter of the temperature of the brine, which varies between 40° and 10° F. Since a 40° evaporator temperature was considered desirable, some means of regulation was necessary to control evaporator temperatures when a lower temperature brine was coming through.

It was found that with a 2½-inch

### New Equipment for a Dairy Plant



The three huge Carrier evaporative condensers pictured here each use only 2 g.p.m. of water. H. V. Beggs (right), engineer for Atmospheric Control Co., Detroit dealer, shows Ben Bartush, Shedd Products Co. official, the low condensing temperatures recorded in a thermometer well.



It's mittens and a cap over his ears for this Shedd Products Co. worker who is stacking cans in the hardening room, kept at -24° F. by a Carrier "cold diffuser." Note absence of frost and the spic-and-span appearance.

supply line, 40° F. brine would maintain a 40° F. temperature in the evaporator. A by-pass was then built between the supply and return lines, and a slow-opening solenoid valve placed in the supply line between the evaporator and the by-pass.

This solenoid valve is connected to a thermostat in the conditioned area, and thus the evaporator temperature is regulated through the amount of brine that is allowed to flow into it. When the solenoid valve is only

partially opened, the brine that does not go into the evaporator is bypassed to the return line.

For heating, the steam coils in the Weathermaker are supplied from the plant's steam system, the normal steam pressures of 120 to 150 lbs. used for plant work being reduced for heating the "dairy bar."

Temperature controls make possible the maintenance of 70° F. temperatures in the daytime during the heating season, and 50° F. at night.

Warren grocery refrigerator, Model 530-P, insulated with Armstrong's LK Corkboard . . . designed for ice or mechanical refrigeration.

### WARREN INSULATES WITH LK CORKBOARD

. . . for lower operating costs  
. . . increased customer satisfaction

THERE'S a close-tie-up between adequate insulation of refrigerated equipment and complete customer satisfaction. And one sure way of securing both—as Warren and other leading makers of commercial refrigerators have proved—is to insulate throughout with Armstrong's LK Corkboard.

Developed especially to meet the requirements of refrigerated equipment, this pure, resilient corkboard provides a permanent barrier to heat . . . insures continued low operating costs. LK Corkboard is moisture-resistant,

light in weight yet structurally strong, and will not settle or pack. Moreover, it is furnished in large board sizes that are speedy and economical to install.

You'll find it will pay you to insulate your equipment with Armstrong's LK Corkboard, give your refrigerators lasting insulating efficiency. For samples of Armstrong's Corkboard—also Armstrong's Standard Corkboard and Cork Covering—write Armstrong Cork Products Co., Building Materials Division, 924 Concord St., Lancaster, Pennsylvania.



#### FOR REFRIGERATION CONTRACTORS

Quick, efficient delivery of stocks of Armstrong's Corkboard and Sundries is assured by conveniently located branch warehouses in principal cities. Armstrong's Sundries are the result of years of experience in the most efficient installation and finishing methods. Ask for the pamphlet, "Armstrong's Insulation Sundries."

## Armstrong's LK CORKBOARD

### Servel Units Used To Study Growth of Mold on Chickens

OTTAWA, Ont., Canada — National Research Laboratories here recently purchased Servel commercial refrigerating cabinets in which tests are being conducted to determine mold growth on chickens.

Feature of the installation is that a different temperature is required for each of the testing cabinets, and at no time are these temperatures allowed to vary more than from plus to minus one-half of one degree.

Each of the two refrigerator cabinets contains four separate compartments of equal size. An intricate system of solenoid valves and thermostats is used to maintain eight different compartment temperatures with a one-third horsepower Servel air-cooled machine unit.

Equipment was installed by Perrin-Turner, Ltd., Toronto, Servel commercial distributor.

### G-E to Show Commercial Refrigerators, Motors & Controls at Dairy Show

ATLANTIC CITY, N. J.—Displays of dairy refrigerating equipment and splash-proof, drip-proof motors and control equipment for the dairy industries will be shown by General Electric Co. at the Dairy Industries Exposition to be held in the Atlantic City Auditorium here Oct. 12-19.

### Peerless Gives Vacations To 47% of Employees

CHICAGO—Forty-seven per cent of all hourly rated employees of Peerless Ice Machine Co. will receive vacations with pay, R. W. Kritzer, president of the company, reports.

Those employees who have been with the company for five years or more, or 16% of the hourly rated employees, will receive a two weeks' vacation; 15% have been employed for two years or more and will receive one week.

### Hill Catalog Describes Cold Storage Doors

TRENTON, N. J.—The complete line of cold storage doors manufactured by C. V. Hill & Co., Inc. is described in a 32-page catalog which the company has just issued.

The catalog lists specifications, dimensions, and other informative data required by architects and contractors, points out construction features, and presents a wide variety of door types and finishes.

### Manufacturers' Agent In Texas Dies

FORT WORTH—Claude A. Olson, Texas representative of Detroit Lubricator Co., Henry Valve Co., Hill Mfg. Co., and Williams Gauge Co., died here Aug. 10. Burial was in Chicago on Aug. 14.

### Class 9100



**Overload!**  
**REGULATORS**

Meet Today's Requirements in Motor Protection for Commercial Refrigeration.

Ratings—1 H.P., 110-220 V. A. C.  
½ H.P., 115-230 V. D. C.

## Here are the Facts..

. . . The overload block is fitted to standard pressure or temperature regulators, single or double bellows types . . . the block is small—no added mounting or wiring problem . . . all one compact unit . . . the relay is trip free and indicating . . . reset button provides manual "on and off" . . . the relay is of the melting alloy

type . . . heater coils as specified and available for field changes . . . double voltage wiring terminals . . . heavy brown Bakelite case . . . steel conduit flange . . . screw driver or knob adjustment.

Manufacturers, distributors, dealers—write for bulletin information on "Complete Control"—the 9100 regulator line for commercial refrigeration.

## SQUARE D COMPANY

REGULATOR DIVISION, DETROIT, MICHIGAN  
SQUARE D COMPANY, INC., LOS ANGELES, CALIFORNIA  
SQUARE D COMPANY, CANADA, LTD., TORONTO, ONTARIO

Export Dept.—H. M. Robins Co., 120 Madison Ave., Detroit, Michigan

## Commercial Machine Makers Certifying Results of Tests

(Concluded from Page 1, Column 1)  
certifications are on file with the association.

It is the belief of association officials that this is a further move for the protection of buyers of refrigerating machinery, and that it should correct tendencies to "overrate" equipment.

Under the "certified rating" plan, association officials declare that a buyer may be sure that when he purchases a 5-ton mechanical condensing unit from a manufacturer whose rating are on file, he may be sure that he will get at least a 5-ton job.

Where there is question as to any of the ratings field, provision has been made for arbitrating the complaint through a committee within the association.

Following is the form in which the ratings are reported:

## Condensing Unit Test Report

Manufacturer's name .....  
Manufacturer's address .....  
Model.....No. of cylinders..... Motor rate Hp.....Bore x stroke.....  
Condenser cooling.....Motor rated volts.....  
Refrigerant.....Motor rated frequency.....  
Test number.....Motor phases.....  
Test date.....

ASRE Rating Group	I	II	III	IV
Temperature Conditions:				
Saturated refrigerant vapor.....F	-10	5	20	40
Refrigerant vapor entering compressor.....F	65	65	65	65
Ambient.....F	90	90	90	90
Ingoing cooling water.....F	75	75	75	75
Outgoing cooling water.....F	85	90	90	95

Test Results:  
Compressor speed.....r.p.m.....  
Capacity.....B.t.u. per hour.....  
Capacity (12,000 B.t.u. per hour).....tons.....  
Motor input.....kilowatts.....  
Motor terminal volts.....  
Motor terminal frequency.....cycles per second.....  
Water consumption.....gallons per hour.....

Compressor displacement in cubic inches per revolution.....

List of accessories in place.....

Remarks.....

I hereby certify that I have been authorized by the above named Company to supervise tests of mechanical condensing units manufactured by it, and certify to the results of such tests. I hereby certify that the above is an accurate report of the results obtained from tests conducted in accordance with the A.S.R.E. "Proposed Standard Method of Rating and Testing Mechanical Condensing Units."

Signature .....

Title .....

**The ANSUL Twins**

**NOTHING BUT THE TRUTH**

**ANSUL REFRIGERANTS are BETTER**

**ANSUL CHEMICAL COMPANY**

MARINETTE » » » » WISCONSIN

## Dealer Turns Trader to Sell Commercial Job

LOWVILLE, N. Y.—C. Ross, Servel dealer for Haverly Electric Co. here, doesn't object to a little horse trading—if it means the sale of commercial refrigeration equipment.

A prospect agreed with Mr. Ross that he should have milk cooling equipment, but insisted that he must purchase a team of horses first. After that, he said, he would buy the refrigeration equipment—providing the dealer would accept two cows as part payment.

This was a rather unusual proposition—but it failed to baffle Dealer Ross. Getting in touch with a friend who had a team of horses for sale, he made a deal, netting himself a little commission. Then he located a man who wanted to buy two cows, and sold him the two he was to take in as part payment on the Servel milk cooling job.

Returning to his prospect, he accepted the two cows, made the sale, resold the cows—and made a profit on the transaction.

## Sausage Sales Rooms Are Cooled by York And Peerless System

CHICAGO—Modern application of commercial refrigeration equipment has been made in the Joseph Slotkowski Sausage Co., pork sausage factory at 2017-2023 18th St. here. Peerless coil and York condensing units were used on the job.

Main sausage sales cooler, said to be one of the finest in the city, is insulated with 4 inches of cork-board on the walls and 5 inches on the ceiling. Walls are of glazed tile all around, and all sausage racks are of galvanized steel construction.

The room is cooled with eight Peerless Flash coolers, and is held between 38 and 40° F. at all times, with a relative humidity of 70 to 80%. This keeps shrinkage at the lowest point. Daily sausage turnover of the cooler is 7,500 to 10,000 lbs.

Another pork sausage cooler, 22 feet long, 4 feet wide, and 11½ feet high, is cooled to 32° F. with two model 52A-108 Peerless fin coils. Daily sausage turnover in this room is about 1,500 lbs.

### Chill Room Also Cooled

Pork sausage room and sausage sales cooler are refrigerated with a 3-hp. York Freon self-contained unit. All sausage going into the sales cooler is pre-cooled in a chill room 23 by 17½ by 11½ feet. This room, and a basement pickle cooler 60 feet long, 22 feet wide, and 8 feet high, are refrigerated with a York Freon unit of 5-hp. capacity.

Sale of the equipment was made by Westervlin & Campbell, York Chicago distributor, and the engineering work was done by Eugene Rytlewski of that organization.

## A Cool Sausage Sales Room



Eight Peerless Flash coolers hold temperatures of 38 to 40° F. in this storage room of the Joseph Slotkowski Sausage Co., Chicago.

## R. P. Sherer New Head Of Sherer-Gillett Co.

MARSHALL, Mich.—At a meeting last week of the board of directors of Sherer-Gillett Co., R. P. Sherer, who has been chairman of the executive committee, was selected as acting president to fill the unexpired term of W. T. Sherer, who died recently.

R. W. Goodrow and R. F. Grant were elected vice presidents in addition to their present positions as secretary and treasurer, respectively.

## Columbus Firm to Make Line of Ranges

COLUMBUS—Plans to build a \$50,000 plant on the manufacturing site in Columbus and Martins Ferry are being made by the Aircraft Metal Co., which will manufacture stoves, ranges, and insulation here, reports B. C. Zuhar, general manager.

The company will spend approximately \$30,000 on machinery and equipment, and more than 100 workers will staff the new division, according to Mr. Zuhar.

## INSIDE COOLING

*In Accordance with*

## OUTSIDE CONDITIONS

FOR  
More Comfort  
WITH  
Greater Economy

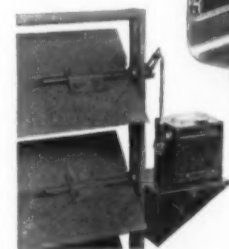
COMPENSATED temperature control relieves the load on cooling equipment and produces better results while it is saving refrigerating expense. Three fundamentals of control produce these results—all based on the measurement of inside and outside conditions. Compensated temperature control measures outside conditions and regulates conditions inside in direct proportion. Economizer control utilizes outside conditions for inside comfort whenever possible. Step control of two or more compressors provides modulation of cooling with the use of minimum refrigerating capacity. Take advantage of these cooling control fundamentals to give your customers greater comfort at less expense. Minneapolis-Honeywell Regulator Co., 2807 4th Ave. S., Minneapolis, Minn.

# MINNEAPOLIS HONEYWELL

Control Systems

BROWN INSTRUMENTS for INDICATING, RECORDING, CONTROLLING

Refrigeration Pressure Control



Modutrol Motor Controlling Louvers



Modulating Thermostat



Duct Temperature Controller

## ELECTRIC REFRIGERATION NEWS

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AUGUST 26, 1936

## The Market for Air Conditioning Abroad

ENGLISH-SPEAKING lands seem to have a monopoly on air conditioning at present. Practically the only countries in which one can find even a trace of this most recent contribution of science and industry to the health, welfare, and happiness of mankind—outside the United States of America—belong to the British Empire. Furthermore, one English (Hall) and five American (Carrier, Frigidaire, York, Kelvinator, Servel) manufacturers supply 99% of all the air-conditioning equipment sold beyond the borders of the United States.

Not even the thoroughly industrial, brilliantly inventive, highly advanced nations of Sweden, Switzerland, and Germany—where electrical development has reached an advanced stage—have begun even to think about air conditioning. And it is actually a fact that most of the delegates to the Seventh International Congress of Refrigeration (held at The Hague, Holland, in June) seemed far more interested in papers which discussed problems in the design of artificial ice skating rinks than in the few papers which treated technical aspects of air conditioning.

### Volume Small

Compared to the volume of air-conditioning business which has been done in the United States, that of the rest of the world seems infinitesimal. True, England has become a good market for air-conditioning equipment in the last year. Quite a number of installations have been made in Australia. A few spectacularly big jobs have been engineered in South Africa. Three or four dozen industrial applications have been installed in India. Algiers and Morocco (exceptions to the rule that English-speaking lands seem to be the only ones interested) have suddenly turned out to be profitable markets for comfort cooling.

### Education Required

But all told, the total number of air-conditioning sales made abroad is far from impressive. The market seems to be as wide open as the need for education is great.

Strangely enough, air conditioning is almost unknown in the countries of the Torrid Zone, where it is most needed. Down through the South Seas from Hawaii through New Zealand air conditioning is regarded as something belonging to a remote world, like zeppelins and streamlined

architecture. The same situation holds true throughout the Dutch East Indies, Malaysia, Burma, Ceylon, great stretches of India, Arabia, Persia, Egypt, and Syria.

Commercially speaking, the tragedy of these lands has been that while they have always offered rich stores of natural resources, vast populations as markets for manufactured goods, and invariably fertile areas for the cultivation of profitable vegetation, the climate has generally defeated the attempts of white men to realize the full possibilities of these luxuriantly endowed lands.

### Needed in Tropics

That the old bromide, "gad, how the tropics get a man," is all too true is the testimony of nearly all the promoters, salesmen, engineers, and executives who go to these countries in search of profits. To be sure, profits are made. Nations like England and Holland owe their great wealth to exploitation of tropical colonies. But leaders of these same nations will tell you that the verdant torrid zone is the world's greatest area of waste and inefficiency. White men who go there must take long vacations at home; they lose their energy while on the job; and all too frequently they return broken in health and spirit after a few years.

Air conditioning should be a sound investment to concerns which do business in tropical countries. Moreover, industrial air conditioning should be the means of establishing factories in lands which produce raw materials and vegetable products, but in which manufacturing has long been considered impossible.

### Market for Bed Coolers

One of the worst features of living in tropical lands is the difficulty of sleeping during the distressingly hot and humid nights which occur so regularly. Already there is a great demand for air-conditioned sleeping rooms in such places as Java, Singapore, and India; but the cost of installing air-conditioning equipment in the high-ceilinged, open-type of homes so common in these countries becomes almost prohibitive. The answer to this problem is undoubtedly the air-conditioned bed, for which there is a tremendous market ready and waiting for the first enterprising distributors who go after it.

### Temperate Climate in Europe

As for the continent of Europe, one commonly hears over there that the reason for its refusal even to become interested in the idea of air conditioning is that the climate is so temperate. Throughout the months of May, June, and July, for example, the writer was touring Europe from one end to the other, and found it necessary to wear a topcoat nearly every day. That air conditioning has its uses even in the most pleasant of weather is, of course, apparent to anyone who has ever worked in an air-conditioned office, plant, or mercantile establishment.

What is needed in the case of Europe is the installation of a few "exhibition jobs," plus an intensive campaign of education. That it can be done has been demonstrated in England during the last year or so.

### Protection Against Gas Attacks

One immediate sales argument for air conditioning may strike American readers as being a bit ridiculous. As a matter of fact, it probably hasn't occurred to European readers yet; but take our word for it, they won't think it is ridiculous. To them it may be one solution for by far the most important personal and national problem facing every European citizen. It is our suggestion that

air conditioning can be sold as a means of national defense.

In England the entire populace is being equipped with gas masks. In Germany and France subterranean cellars are being constructed where civilians may flee for refuge against gas attacks. Other European countries are considering the erection of shelters-on-stilts, as well as storm cellars. But see how fortunate the owners of an air-conditioned home, office, or factory would be in case of gas attack! Suitable filters, something like those used in gas masks, could be devised to keep poisonous gas out of the incoming air. Or, the intake could be constructed like a chimney, for gas lies low upon the earth. In any event, instead of expending great sums on gas masks and gas shelters, which would be useful only in the event of attack, why not invest some of that money in air conditioning, which should be fully as protective, and at the same time useful every day in the year?

### Wide Open for Development

The markets for air conditioning abroad are many and various. They have not been exploited at all; for the most part, they haven't even been cultivated. The United States of America, where the idea of air conditioning was born, and where practically all the experimental and development work has been done, has virtually no competition in the manufacture of air-conditioning equipment. With competent assistance from foreign trade officials in Washington, air-conditioning equipment should go past trade and tariff barriers much more easily than products which are in competition with foreign manufacturers.

It is needed everywhere, and in the "hot countries" should be the greatest blessing of the industrial age. Without hesitation any student of foreign trade should say that air conditioning abroad has a great future.



## Morals of Business High As Those of Professions, Avers A. E. Wiggam

"Are modern business morals as high as in law, medicine, and other professions?" asks Albert Edward Wiggam, and answers by quoting Charles S. Rychman: "In no other human endeavor is the moral plane as high as that observed by modern business toward the buying public."

That is so true that anybody can see it who gives the matter even a little thought. Lincoln was by no means the first to say that you can't fool all the people all the time; the saying is as old as Pliny, who probably did not think it up for himself, because it is an adage embedded in all human experience.

The man who aims at success in business not only is careful not to try to fool all the people all the time; he knows he can't afford to fool anyone at any time. The wise merchant does not sell goods; he sells reputation—his own first of all, then that of the people from whom he buys. And nothing is more brittle, more easily damaged, than reputation. Therefore he protects it, even at a loss at times.

There is no better advertisement than money returned to the unsatisfied customer, for he can't keep the fact to himself; he must spread the word that he has found a merchant who stands behind his goods.

On the other hand, there is no more uncertain gain than money taken consciously for an inferior product that the merchant knows to be inferior, but sells for the best; for a people lose faith in him, and say so.

Look around you at the big factories and business houses of Detroit. How did they get that way? How do they stay that way? By keeping faith with their public. There is no other method, and the men behind them know it.—Detroit News.

## Letters

### Opportunity in Mexico

Saavedra Y Tarditi  
Representaciones Y Comisiones  
Automotive, Electrical, Hardware, Radio  
Ayuntamiento 161, Mexico, D. F.  
August 19, 1936

Gentlemen:

We understand you are the leading publication on the refrigeration line in the United States. We are interested in securing the representation of American manufacturers of refrigeration parts and accessories and would appreciate it very much if you would pass our inquiry on to the different manufacturers known to yourselves. For a period of over 13 years we have been acting in the capacity of factory representatives for a number of American manufacturers of automotive equipment and electrical supplies. We buy nothing for our own account but operate on a commission basis.

At the present time we are handling the line of Perfection Refrigeration Parts Co., of Harvey, Ill., and should like to add a few accounts in order to round out our refrigeration line.

We shall be pleased to furnish the necessary trade references to the manufacturers interested in a connection with our firm. G. SAAVEDRA

### Don't You Ever Advertise?

P. J. Orbesen & Co., Inc.  
1633-43 North Hamlin Ave.  
Chicago, Ill.  
Aug. 17, 1936

Editor:

Referring to your issue of August 12, question No. 2880, that of an Iowa distributor requesting the names of manufacturers of florists refrigerators, especially that of a Chicago manufacturer. We wish to suggest that you get acquainted with your subscribers.

We have manufactured florists equipment for 20 years and have installations in all parts of the country. Most of this work however has been for dealers and has carried their name. We would appreciate your forwarding this information or give us the company's name so that we may contact them.

We also wish to notify you of our recent entrance in the display case field and we are now manufacturing a complete line of cases. G. W. ORBESEN

### Market for Used Models in Hawaii

Honolulu Technical School  
P. O. Box 2941  
800 S. Beretania St.  
Honolulu

Editor:

Would you please advise us if you have knowledge of any dealer preferably one who has taken in a large number of General Electrics or Frigidaires, who is willing to dispose of these at a nominal figure. We would like to contact a dealer or distributor, somewhere on the mainland, who is taking in trade General Electrics, 5, 6, and 7 foot, etc., and Frigidaires, 4 to 7 foot, who would be willing to ship them, crated, to us on a cash basis. S. E. GILES, Manager

### Votes for 'Around the World' and Commercial News Features

Herrick Refrigerator & Cold Storage Company  
Waterloo, Iowa  
Aug. 17, 1936

Enclosed find check covering renewal to your publication as evidenced by copy of invoice attached.

It might interest you to know that writer has followed with interest your series "Round the World" with George F. Taubeneck. We feel this has been an outstanding feature of your publication this year.

We also are pleased to note more space devoted to commercial refrigeration. EDW. N. NORTHEY

### "Master's" Thesis on Refrigerator Advertising

1115 So. Genesee Drive  
Lansing, Mich.  
Aug. 21, 1936

Gentlemen:

I am preparing a Master's thesis at Michigan State College, dealing with refrigerator advertising. I have been advised that your publication might be available to me, and would be of immense value. My project covers the advertising on all refrigerators for the first six months of 1936. I would be very appreciative of any help which you might be able to offer me in this matter.

BESSIE HOWE GRAGLEY  
Answer: Perhaps some of the past masters of refrigeration advertising would like to give this gal a hand.

### Servicing Since 1924

Pennsylvania Power & Light Co.  
901 Hamilton St.  
Allentown, Pa.

Dear Sirs:

I certainly do not know how I got along without the REFRIGERATION NEWS all these years since 1924 when I entered the service and installing game of all types of refrigerators.

All along we were well supplied with information from G. E., Whse., Servel & York Companies but the time has come when we service orphans and there the MASTER SERVICE MANUAL shines. But I need a larger variety of parts catalogues, and you can give me that much needed service by entering my name on your catalog mailing list for which I wish to thank you in advance.

I remain an ELECTRIC REFRIGERATION NEWS "fan."  
JOHN L. SCHALL,  
Service Dept., 1st. Fl.

### Another 12-Year Veteran Of Service Work

30 W. Fifth St.  
Pottstown, Pa.  
Aug. 18, 1936

Gentlemen:

I have been a Frigidaire service man for the past 12 years and have been a subscriber to your valued paper for a number of years.

Quite frequently I am called on to service other makes of refrigerators. This makes it necessary to shop around for parts. I would therefore like to be put on your catalog mailing list. ALFRED HAAS

### A City Engineer Wants Catalogs

City of Fresno  
Department of Public Works  
Fresno, Calif.  
Aug. 13, 1936

Gentlemen:

I have recently renewed my annual subscription to ELECTRIC REFRIGERATION NEWS. I would be pleased to have you place my name on the mailing list for catalogs and engineering information on Refrigeration and Air Conditioning. GEO. M. BOWMAN,  
City Electrical Engineer,  
Dept. of Public Works.

### Conducts a 'Used Refrigerator Exchange'

Used Refrigerator Exchange  
412 South Cuyler  
Pampa, Texas  
July 5, 1936

Wish to compliment you on the splendid paper you are publishing.

I have only been taking it a short time and it certainly has been of untold value to me.

Will you please put me on your catalog mailing list as I would like to get in touch with some more refrigerator supply firms.

I am in the used refrigerator selling and servicing business. V. A. HOWELL

### List of Service Men

The EBCO Mfg. Co.  
401 West Town St., Columbus, Ohio  
Aug. 14, 1936.

Gentlemen:

Will you kindly give us a list of the Service Companies who are prepared to furnish service on electric water coolers installed in Government work. A. R. BENUA, President.

Answer: We are getting many calls for lists of service men but, so far, we have not believed that our records were sufficiently complete to justify publication as a Directory.

The News invites service men to register and give full information regarding their experience and facilities for handling business.

Suggestions are also invited regarding a practical plan for rating independent service companies. There seems to be a need for some method of classifying the different types ranging from the individual service man with a kit of tools to the large contractor having a shop and office force.

### Service on Electrolux

C. Niss & Sons, Inc.  
2021 N. Third St., Milwaukee  
Editor:

If possible, please furnish us with the name of a service company who can repair or rebuild Electrolux gas refrigerator units of the water-cooled type. D. A. BOCK,  
Electrical Dept.

Answer: Contact the main office of Electrolux Refrigerator Sales, Inc., 51 E. 42nd St., New York, N. Y., for information as to the nearest point where service on Electrolux machines can be obtained.

As an electric refrigerator salesman I have worn out my Specification number (April 22, 1936) of your REFRIGERATION NEWS and I am enclosing 25¢ in coin for which kindly mail me a new copy, and oblige.—G. W. Mundy, 958 Ridge Ave., Rockford, Ill.

## Around the World

With George F. Taubeneck

At the beginning of the year Editor Taubeneck started on a seven months' journey around the world, visiting ELECTRIC REFRIGERATION NEWS subscribers. He traveled 35,000 miles through 32 countries and 14 seas. Subscribers in 67 cities greeted him en route, vying with one another in acts of hospitality.

Every week since the beginning of the trip the world-traveler has been contributing around 10,000 words of continuous travelog to the columns of the News. This is the 34th instalment in the "World Series."

Last Saturday night radio listeners who tuned in on station WJR heard George tell some of his experiences over the air.

### Westinghouse Leads

Upon arriving in Tel-Aviv (6:45 a.m.), I got bogged down in the mire of an old quandary: nobody could speak English. The cab drivers seemed to know nothing but Hebrew.

After a lot of arm waving and expostulation, one driver finally caught the word, "refrigerator."

"Ah!" he beamed, "Frigidaire."

With great relief I climbed into his cab. A few minutes later we landed in front of the Westinghouse showroom.

Waiting for someone to open up, I spied a Mills counter freezer in the window of a small restaurant. The proprietor couldn't speak English, either; but we discovered our French was mutually understandable, and I learned that in the five months he had had the counter freezer, his ice cream trade had quadrupled, that it had brought new patrons to the restaurant, and that it was a most satisfactory and profitable investment.

DAVID LEVINSON, the Westinghouse distributor, seemed mighty glad to see me. He is leading the refrigeration sales race in Palestine just now, and was anxious to tell all about it.

Climax of his hospitality was a banquet at a seaside hotel in Tel-Aviv, attended by his entire staff.

At the banquet he read a speech. I'd like to have you hear it, too, and so it follows:

"I am glad to greet you in Palestine as a representative of the refrigeration press in America. A close contact with you as one of the leaders of American refrigeration principles is very important for us in Palestine with its subtropical climate, where refrigeration is one of the first necessities.

"We have gathered together this evening—from one side Mr. George Taubeneck—from the other side the leaders of the Westinghouse Palestinian distributors organization.

"We wish to take this opportunity to express our greetings to all those co-workers in the refrigeration industry with whom we are connected and whose good will and ingenuity have made possible the successful merchandising and satisfaction of our world known Westinghouse organization.

"Starting from scratch two years ago with all odds against us—we have attained one of the first places in the Palestinian refrigeration markets, and have grown to be an important factor in the American export trade. Keeping in view the fact that

in such a short time we sold approximately 2,000 units, domestic and commercial, and keeping in mind the work necessary to install and service properly this aggregate of machinery, you will see that this can have come about only with the close cooperation of the executives of the Westinghouse corporation in America, and we are sure that you will utilize this opportunity of explaining to them the climatic and other peculiar conditions that our country offers in the refrigeration field. In this way your help will be of great importance to us.

"I wish to propose a toast for the success of your efforts to unite the refrigeration world closer."

### On the Record

In two years Mr. Levinson's organization has sold 1,800 household and 200 commercial refrigerators. Alongside April, 1936, in the Levinson records is the figure: "446 units." Pretty good, what?

Tel-Aviv proper is combed for business by six Westinghouse salesmen who work on a commission-plus-bonus basis. The bonus system is a bit unusual: 3% on all business sold through the showroom is apportioned each month to the salesmen, who split that money up among themselves, according to a ratio based on their respective earnings during the month.

An Ivory-soap percentage (99 44/100) of all sales are on time. "Hire purchase" sales are not recognized legally in Palestine; so the store takes a note from the purchaser for the price plus interest, and the customer pays the note back in sometimes irregular installments. Not a single Westinghouse refrigerator has been repossessed by the Levinson organization.

All of the Westinghouse salesmen "just walked in," having worked for some other Palestinian distributor previously, or, in some cases, having sold refrigerators in other countries. They do no house-to-house canvassing; all their time is taken up canvassing the owners of the new dwellings which are rising from the sands in such incredible numbers.

Mr. Levinson speaks English, German, French, Russian, Hebrew, Yiddish, Polish, and Arabic. His salesmen must be acquainted with all those tongues, plus Spanish. Each salesman generally specializes in one particular language; but all are multilingual.

White trucks and buses are also sold by Mr. Levinson. He has been in Palestine 12 years.

"If anyone had told me three years ago that I'd sell 400 refrigerators in one month, I'd have said he was

crazy," laughed Mr. Levinson. "These German Jews, though, have high standards of living."

His advertising—billboards, handbills, newspaper space—is highly original and definitely artistic. It is all executed by local artists.

### 'Cut 'em Open'

WILLIAM ENGLE, service chief, learned the business with Kelvinator of Canada. He came to Palestine to work for Carrier-Brunswick, joining the Westinghouse organization later.

He maintains day-and-night service, with five household and four commercial service men in Tel-Aviv, one commercial and one household man in Haifa, and one man in Jerusalem. All are Jews, all are graduate engineers (one has a diploma from the University of Minnesota).

Household machines are guaranteed for two years; commercial for one.

Refrigeration specialists are almost rare in Palestine. Levinson and Engle maintain that they can find jobs for all the trained service men who are willing to come to Palestine, and make it their home.

Normally the climate in Palestine is most balmy. But from 40 to 50 days in the year are affected by the "homsseen," a hot wind which blows up from the desert. On these days the indoors temperature rises to 110°, and only God and the nomadic Arabs know what it is outdoors.

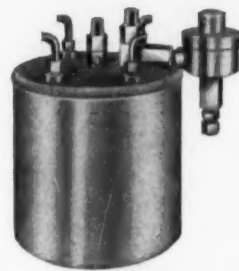
Head pressure runs high at such times, and condenser trouble is apt to develop.

Installations near the seashore, both household and commercial, are affected by the moist salt air. This rusts motor rotors, sogs insulation, and causes the motor to heat up. If the "homsseen" happens along after the salt air has done its damage, it's

(Continued on Page 12, Column 1)

## Temprite Profits Are Easy Right Now

You know the Temprite is a great deal more than just a beer cooler. It is the best means of dispensing beer properly and it assures the greatest economy. A simple demonstration proves this invariably.



There are two classes of beer dispensers—those who know the possibilities of Temprite and those who do not. The former are now using Temprite. The latter would if they had the facts.

Now is the time to tell the Temprite story. The dispenser has money and he is receptive. Get in and increase your profits through Temprite sales.



**TEMPRITE PRODUCTS CORPORATION**  
1349 EAST MILWAUKEE AVE. - DETROIT, MICHIGAN  
ORIGINATORS OF INSTANTANEOUS LIQUID COOLING DEVICES

## TWICE FORTUNATE IS THIS REFRIGERATOR DEALER

1. He handles a reputable make of refrigerator
2. The refrigerators are equipped with G-E motors



LET G-E MOTORS HELP YOU SELL



## Buildings on the Desert Sands



A few years ago, the spot which is now Tel-Aviv was a desert wasteland. Here are some examples of current construction. 1. Many modern apartment buildings, similar to this one, are now being erected. 2. Here are some going up. All Tel-Aviv land was once the sandy waste shown in the foreground. The building boom has lasted for four years, and is still going. 3. One of the city's sidewalk cafes. 4. Modern store fronts are typical of Tel-Aviv's downtown business district.

YES, this dealer is doubly fortunate. He sells refrigerators that are made by a manufacturer who has made good products for many years; and, in addition, these refrigerators are equipped with G-E motors. The reputation of the manufacturer, plus the reputation of General Electric, leaves no doubt in the minds of prospects concerning the high quality of the refrigerators; thus the dealer can spend more of his time in convincing prospects that electric refrigeration is the most economical way to preserve food.

General Electric's high standards of quality are well known, and G-E motors have an enviable service record for quiet, dependable operation. If the refrigerators you sell are equipped with G-E motors, you can make sales more easily, because your customers will have added conviction that these refrigerators will give them the trouble-free service they want.

Can you afford not to avail yourself of this added sales appeal?

General Electric, Dept. 6A-201, Schenectady, N. Y.



84 PER CENT SAID,  
"GENERAL ELECTRIC"

In a recent impartial survey, electric-appliance dealers and department stores were asked:

"What makes—or brands—of electric motors, in your opinion, would make it easier for you to sell appliances?"

General Electric was named by 84 per cent.

070-141

**GENERAL ELECTRIC**

## Around the World

With George F. Taubeneck

(Continued from Page 11, Column 3)  
Just more than the poor, belabored motor can take. Mr. Engle claims that these conditions are especially tough on open type jobs.

On earlier refrigerators shipped to Palestine, white lacquers often yellowed; although there's been little trouble of this sort in recent years. A rust-proofing process like Bonderizing, says Mr. Engle, is a big help to refrigerators shipped out to work in Palestine.

Mr. Engle's staff opens up the Westinghouse hermetically sealed compressor, and fixes whatever may be amiss, if, as, and when that be necessary. Ship it back to the factory? What? And pay the 12% duty again? Oh, no. Sure they can fix 'em. And they stay fixed!

When people back at Mansfield seemed dubious about so unorthodox a procedure, Mr. Levinson took one of the units his staff had repaired over to Mansfield, and showed 'em. Mr. Levinson said that they seemed highly impressed.

Moreover, it's necessary to revise the 110-volt motors in the Westinghouse units to fit in with the 220-volt current supplied by the Palestine Electric Corp.

### Need Parts Jobber

One thing Palestine seems to need is an independent parts jobber with sufficient capital to maintain an adequate stock of everything needed

to service all makes. Every distributor complained about the large stock of parts he had to keep on hand.

It takes three months to fill an order for parts from America. Expansion valves and copper tubing are needed especially.

H. S. EHRLICH, 28 Frug Street, is representing Kason hardware in Tel-Aviv, and also handles finishes, rubber gaskets, and a few other items.

Levinson Bros. also make their own fittings; neat-appearing flare fittings of forged brass. While I was there Mr. Levinson showed me an order for \$1,047 worth of controls he was sending to Minneapolis-Honeywell, and a duplicate copy of an order for \$2,283 sent to Melchior, Armstrong, Dessau. He had on hand at that time 300 expansion valves.

Levinson Bros. also makes commercial coils, cabinets, and display cases—using oak and Spanish cork for the latter.

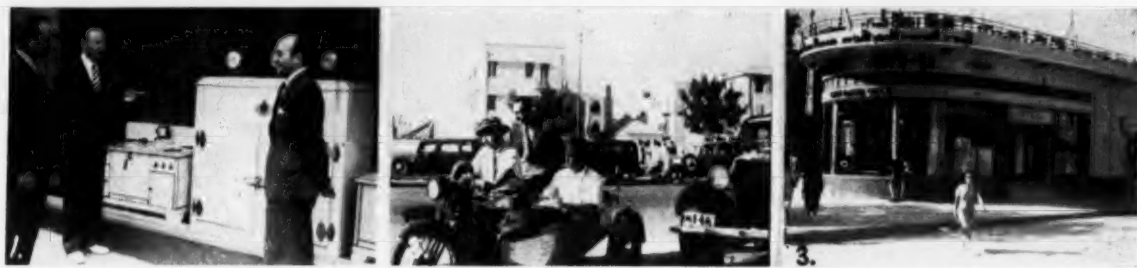
So far the chief demand for commercial refrigeration has been in the field of restaurant service boxes and walk-in and reach-in coolers.

Practically no demand has appeared for water coolers. Beer cooler business is just beginning to pick up.

Most of the commercial refrigeration business has gone to the Engineering Corp. of Palestine, Ltd., which handles Frigidaire household and commercial equipment, and Hall-Hallmark (English) air conditioning and industrial machines.

Headquarters of this concern are

## Refrigeration Is Big Business in Tel-Aviv



1. Interior of a Westinghouse dealer's showroom in Tel-Aviv. Two salesmen are demonstrating a large family size refrigerator. 2. George Taubeneck makes a service call with one of David Levinson's service men. 3. Headquarters of RCA-Victor Co., Tel-Aviv. The company recently took over the Leonard franchise in Palestine.

in Haifa, which we did not have time to visit. However, S. WARSHAWSKY, a Russian who manages the Tel-Aviv branch, told us that not only did Frigidaire lead in commercial sales, but that 90% of the total Palestine business in all types of refrigeration equipment had been done by his company.

### Crosley Sales

JACOB LEVINSON is the distributor for Crosley refrigerators in Palestine. He does not retail selling himself, working only through dealers, of which he has six.

Last year 450 Crosley refrigerators were sold in Palestine, I was told. Best dealer is ALEXANDER ZALKIND, who has retail stores and sales organizations in Jerusalem and Tel-Aviv.

At one time Crosley was sold by Levinson Bros. (DAVID and ALEXANDER). In those days they were selling all Westinghouse appliances but refrigerators. When Westinghouse suggested that they sell the complete

line, they acceded, and turned the Crosley franchise over to a third Levinson brother, the aforementioned Jacob.

### Electric Rates

Palestine Electric Corp., an English concern, supplies electricity to all of Palestine except Jerusalem.

Power rate is one plaster (about 5 cents) per kilowatt hour, with a sliding scale reduction for increased use. Refrigerators, irons, and ranges can make use of the power rate.

Illumination rate is 2.8 plasters per kilowatt hour. Fans, toasters, percolators, and other small appliances go on this rate.

Up-to-1-hp. motors must be 220 volts, single phase. Over-1-hp. motors are three-phase, 380 volts.

Last year 75 electric ranges were sold in Palestine.

Over here the popular cooking device is the "primus," which is made in both Sweden and Palestine. It weighs about two pounds, and sells for \$1.50.

The "primus" burns kerosene, and looks and acts something like a blowtorch. It gives a quick, hot flame. For baking, a tin-can-like "wonderpot" is put over the top.

### Gibson & Germans

Svistotzky Bros., Zenith radio distributors, took on the Gibson refrigerator line in February. So far this concern has found the 4.15 ft. box the best seller. It retails at 33 pounds (about \$169).

The three Jews who were in the handsome, well-lighted showroom were quite busy when I walked in; and seemed, moreover, suspicious.

So I simply left my card, writing on it the name of my hotel.

That night a rather breathless D. GALLOON, refrigeration engineer for the firm, and longtime subscriber to the News, came down to the hotel. Mr. Galloon's most interesting information was that competition from German refrigerators was being felt. The best of these, he said, were: the Ate, made in Frankfurt; the Bitter-Polar, made in Cassel; and the Bosch, made in Stuttgart. In the line of commercial refrigerators he named Wegelin & Hubner, Halle; and Linde, Frankfurt.

### Carrier-Brunswick

Leading air-conditioning factor in Palestine is E. N. Petigrow, engineer and distributor for Carrier-Brunswick, Inc.

His refrigeration business comprises more than 400 installations, ranging from ¼ hp. to 10 hp. each.

He has made the following air-conditioning installations:

Cinema Ophir, Tel-Aviv; using two 40-hp. compressors.

Boris, Ltd., Haifa, office building; using two 15-hp. compressors.

Library, Jerusalem; one 7½-hp. compressor.

Sova Bakeries, Tel-Aviv; one 7½-hp. compressor.

Kupath Holim Hospital, Tel-Aviv (babies room); a 3-hp. compressor.

Hadassa Hospital, Jerusalem (babies room); a 2-hp. compressor.

Building Materials Showroom, Tel-Aviv; a 2-hp. compressor.

### New Atlantis

"Come see my shining palace  
"Built upon the sand."

So hymned EDNA ST. VINCENT MILLAY; and a great many Jews must have read her "Renaissance." Tel-Aviv, the "renaissance" of Jewish nationalism, is built upon the sands. And it shines.

This is the miracle city of the Near East. In fact, I should say (and I can say, having been around it) it's the Miracle City of the World. It has become the largest city in the most important trading center, and the incubator of Palestinian industry.

It is, moreover, the Atlantic City of the Mediterranean. Since visiting Tel-Aviv and before writing these lines, your correspondent has traversed both

the French and Italian Riviera. He is acquainted with Nice, Cannes, Juan-les-Pins, Menton, Monte Carlo, Vintimiglia. These watering places are as charming, as picturesque and lovely as any on earth. But, with the possible exception of Juan-les-Pins, they are quaint rather than modern.

If it's the latter spirit you appreciate in a seaside resort, Tel-Aviv is the place for you. It's the new Atlantic City.

Fine sand, soft breezes, warm water, gentle breakers, and voluptuous figures (see pictures) in the scantiest of attire—the beach. Boardwalk, cafes with open air tables, deluxe hotels, music issuing from every doorway, bright colors, good women walking bad dogs (reversing the Atlantic City formula), gaiety, youth—the seaside. It's Miami Beach or Atlantic City all over except that the eyes are brighter, faces cleaner, figures better, and prices lower.

There's even an indigenous orange drink (you won't find that anywhere else around the Mediterranean) which proudly proclaims itself in Americanlike posters: "Assis—the National Drink."

Blondes are as prevalent along the Tel-Aviv beach as at Atlantic City or Miami Beach. Many of them are artificialized, direct from New York or Brooklyn. But some are natural, corn-haired Brunhildes from Germany.

There is a story about a once-wealthy resident of Atlantic City who bought a lengthy strip of land along the beach at Tel-Aviv before the city amounted to much, sensing its possibilities.

He went back to America after a short visit, and promptly forgot all about his Palestinian acquisition in the feverish excitement of the market-playing days.

After he lost his shirt, he was wandering disconsolately down the Boardwalk one day when suddenly he recalled that he had a potential Near East Boardwalk in his possession.

Back to Palestine he went, and the results you can see now. It's still a bit scrubby, but the makin's are all there.

### Haifa & Jaffa

At present, Tel-Aviv is not a port. Being adjacent to the ancient port of Jaffa, all unloading for Tel-Aviv is done at Jaffa. Tel-Aviv citizens are trying to move the customs offices and suchlike from Jaffa to Tel-Aviv, particularly since the recent troubles with the Arabs. Neither city has a real harbor. Ships must anchor well out, and discharge their cargoes via lighters.

Haifa is the only city along the entire coast of Palestine which has a harbor, and through this port go more than 7,000,000 cases of oranges annually—also grapes, grapefruit and bananas from Jewish vineyards and orchards.

Industry has begun in Haifa, too. Soap, flour, cement, textiles, tobacco, cigarettes, candy, dental products, and shoes. Feeding youth, energy, and talent into these industries is a technical college where Jewish scholars may study for small tuition fees.

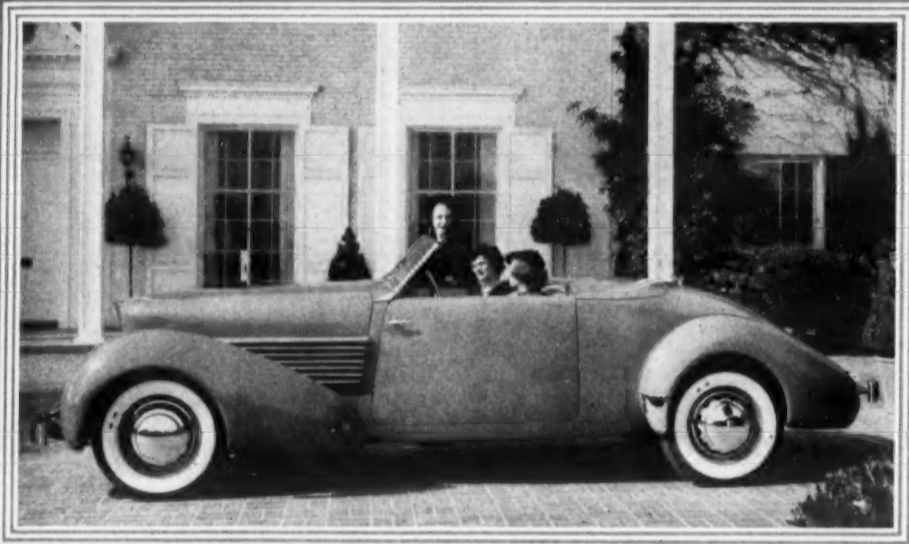
From Haifa Jewish boats sail with cargoes destined for such distant ports as New York. They fly the Jewish national flag, which consists of the Star of David (the familiar two equilateral triangles of the synagogues) in blue on a white background, between two broad blue stripes.

### Tel-Aviv

"A Gateway on the shores and a Lighthouse on the sea"; so reads the emblem of Tel-Aviv. How this city was born is an interesting page in history.

In 1906 a group of Jewish merchants and professional men in Jaffa formed a society which they called "Ahizah Bait." Its object, to build a garden suburb north of the city. They acquired a sandy area of 121 dunams for the building of this quarter, and named it Tel-Aviv.

And so this "New-Old Land," the Hebrew name for the Jewish Utopia (Concluded on Page 13, Column 1)



QUALITY  
IN EVERY DETAIL

C O R D

AUBURN AUTOMOBILE CO. AUBURN, INDIANA

## Around the World

With George F. Taubeneck

(Concluded from Page 12, Column 5)  
of Dr. Herzl, began with 60 houses for which its founders borrowed the necessary 250,000 francs from the Keren Kayemuth.

The first cornerstone was laid in 1909, and during the first years 60 houses were built for as many members of the society. Each year another 30 or 40 houses were added, and slowly other quarters growing up roundabout united with it to extend its boundaries.

The war stopped further development of the suburb; and its inhabitants were banished by the Turkish government on suspicion of sympathy with the Allied Powers, arising from the peoples' Zionist aspirations.

After the war and the Balfour Declaration, immigration to the country began with renewed force as the vision of a Jewish Homeland once more took hold. Tel-Aviv became the gateway to Palestine.

It is "the city of miracles, which arose almost over night from the sands on the Mediterranean Shore." Its population grew 203.6% from 1922 to 1931, from 15,185 to 46,101.

The housing problem is acute. With an ever increasing stream of home-hungry Jewish people coming into Tel-Aviv, the prices of land are booming, and land speculation is high.

The city itself is a combination of 116 individual quarters amalgamated into one. Some of them were founded on waste stretches of soil, some on sand dunes, and others on tracts of land overgrown with scrub and ruined vineyards.

It has 10,000 dunams area now. The people of Tel-Aviv will tell you that the thousands of dunams of land in Jewish hands around the city will soon be a part of Greater Tel-Aviv.

A British architect, Professor Geddes, had a hand in the planning of this city of miracles. He made plans for the northern section of Tel-Aviv which later were extended to provide for the sections not included.

Although Tel-Aviv subsists on industry and commerce, it depends for its food on the agricultural products of the Jewish settlements surrounding it. At present these farms are unable to meet the demands of the city, and so many thousands of pounds are spent in purchasing agricultural products from non-Jewish farms in Palestine, and from foreign countries such as Syria, Cyprus, Turkey, Rumania, Bulgaria, and Latvia.

The city serves as a center for the export of citrus fruit (the principal agricultural product of the country) to all the markets of the world through the port of Jaffa. Plantation companies all have their offices there, as do manufacturers of associated products such as cases for oranges, and printing presses for wrappers (printing orange tissues is one of the biggest printing jobs in the city).

Like all great religious centers, Tel-Aviv is a city of holidays. Revived and revitalized, all the ancient Jewish festivals are made an occasion for public rejoicing—or, as the case may be, for public mourning.

Succoth, the Feast of Tabernacles, is celebrated not only by the farmers of the Valley of Jezreel but by the city dwellers who welcome a prosperous harvest in Ein Harod and Nahalal by dancing the "hora" in the public squares of the city.

One of the most magnificent sights is the torchlight procession of school children with which Hanukkah, the ancient Maccabean Feast of Lights, is initiated. At this time the giant electric Hanukkah candelabra on the tops of high public buildings are illuminated. They can be seen even by the distant ships in the harbor.

The New Year of the Trees, or the celebration of Hamisha Asar Bishevat, is another spectacle worth traveling to Tel-Aviv to see. Thousands of children crowned with garlands of anemones and cyclamen and armed with garden tools greet the spring by planting new trees in the gardens and avenues of the city—a tradition worth imitating by American cities.

Passover; the Festival of Freedom; Lag Baomer, celebrated with great bonfires throughout the city; Shavuoth, when the children offer the first fruits of their gardens to the Keren Kayemuth for the redemption of the soil of Palestine—all these are joyously and colorfully celebrated.

Colored lights, music, and masked figures make Purim and its Carnival the most famous of the city's holidays. Even the streets take on new identity in names derived from the Biblical story of Esther.

All the ancient enemies of the Jews through the ages receive their due in the mock trials which are part of

the satirical pageant depicting the history of ancient Israel. In recent years another feature has been added to Purim—the reading aloud of "Megilath Esther" in the courtyard of the Great Synagogue, full to overflowing for the event.

Simhath Torah is another feast celebrated with enthusiasm. Dancing in the synagogue around the Torah scrolls, and merrymaking in the streets and squares of the city are parts of this festival. A new tradition is the visiting of the house of Bialik on the eve of the festival; this because on the first Simhath Torah following the death of Bialik in 1934 there was no dancing on the streets in token of Tel-Aviv's sorrow over the loss of the great poet of Israel.

Just as lights go up for the celebration, lights are dimmed and places of business closed for Tisha B'av, the anniversary of the destruction of the Temple. Memorial days are observed also for the great leaders of the present movement of revival who have died in recent years.

Jewish history and religion again are reflected in the street names—a "who's who in Jewish life" which includes Patriarchs, Judges and Kings of Israel, the Prophets, great women in the Bible, ancient and new Jewish communities, famous centers of learning, Jewish leaders, Gueonim, Rabbis, teachers, philosophers, historians, founders of the labor and of the Zionist movements, famous non-Jewish friends of the Jewish people, Hebrew writers, artists and musicians, and heroes and defenders of Palestine.

One of Tel-Aviv's boasts is that it is a "city of enlightenment." The first public building erected there was the "Herzlia" Gymnasium, the first Hebrew high school to be established in the country. Students come from all over the world to receive Jewish education.

Only 5% of the total population of the city is illiterate, which we are told is the smallest proportion of illiterates to be found in any city in the world. It is true that the city seems to have a drawing power for representatives of the liberal profession. A census taken in 1934 recorded 400 practicing physicians, 165 dentists, 700 school teachers (apart from private teachers), more than 200 engineers and architects, 110 lawyers, approximately 250 writers and journalists (out of the 350 in the entire country), and 40 painters and sculptors (out of a total of 60).

Children attending school equal approximately 100% of the children of school age, it is claimed. In 1934 and 1935, 11,097 children attended the 24 public schools and the 35 kindergartens. Elementary education is maintained almost entirely by the municipality aided by a small subsidy from the government. In the first years following the war all the schools were financed by the Keren Hayesod. In 1935 elementary education was made entirely free.

There are in all 120 educational institutions including evening classes in secondary schools and the University, music, trade, art, and dancing schools, with a total of 20,000 pupils.

It is a country of widespread interest in education—in Tel-Aviv day laborers, clerks and professional people often complete a full day's work before going to classes in the University.

We mentioned before the printing of paper wrappers for oranges as an important part of the printing trade in Tel-Aviv. The publishing trade also is rapidly developing. Of the 80 printing presses in the city, 15 to 20 of them are of good size and modern. Of the 500 books published in Palestine last year 382 were produced in Tel-Aviv; and of the 57 Jewish newspapers and periodicals, 47 were printed in this city.

The two dailies, *Davar* and *Haaretz* both have modern printing plants. In 1935 the city boasted 11 weeklies, eight fortnightlys, 21 monthlies, two bi-monthlies, one quarterly, and two annuals.

Palestine exported books valued at 10,000 Palestine pounds last year, most of which were published in Tel-Aviv.

Amusing oneself shouldn't be hard in this city with four theaters centered there—the Hebrew Art Theater, "Habimah"; the Workers' Theater, "Haohel"; the Palestine Comedy; and the satirical theater, "Hamatate"—the Palestine Opera, the Philharmonic Symphony Orchestra, eight "open" theaters, and cinema houses—in addition to the large halls and amphitheaters in the Fair Grounds which are frequently used for concerts and meetings.

Equaling if not overshadowing the

## Palestinians Are Going Places—Even on the Beach



Noticeable in these camera scenes of the always-crowded beach at Tel-Aviv is the activity shown by sunbathers, ball-tossers, and swimmers alike. Evidently the Palestinians of the future are going to be sturdy and sun-loving.

secular centers in Tel-Aviv are the religious and traditional institutions, including more than 160 synagogues and houses of learning in the city. Of these 75 have their own permanent quarters. During the high holidays the number of synagogues is doubled and the attendance estimated to be about 75% of the adult population.

Three "Yeshivoth" (theological seminaries) function in Tel-Aviv—many students having been transferred to Tel-Aviv from the "Yeshivoth" abroad, which were closed down by governmental decrees.

Ever conscious of the need of reviving Palestine culture, citizens of Tel-Aviv regard the educational exhibitions as one of their outstanding cultural achievements. The first of these was held in the spring of 1935 and was dedicated to Bialik. It depicted 14 aspects of Hebrew culture in Palestine, and represented all that the Jews have created in the country during the last century.

Going from the mental to the physical, it is interesting to note that athletics are not neglected in this versatile city. Youth and sports organizations have a membership of more than 10,000.

Perhaps this interest in the outdoors is a good advertisement for Tel-Aviv's claim to be a health resort comparable to more famous Mediterranean watering places. Like the label on a patent medicine bottle is the list of ills which the common salt, magnesium chlorate, sodium carbonate, magnesium carbonate, iodine, bromide, and various gases in its sea water will cure. Plans for exploitation of the full resources of the sea shore as a recreational and health spot are now in process of preparation.

The climate of Tel-Aviv is subtropical and maritime. To substantiate this statement the citizens will tell you that the longest day is 14½ hours, June 21, and the shortest day, Dec. 21, is ten hours and five minutes. The average annual temperature is 20.1° centigrade. Winter lasts only three months, from December to February, and the heaviest rains fall during that period; March, April, and May are the spring months, and summer lasts from June until September.

Testifying to the sanitary and hygienic conditions of the city are the high birth rate and low mortality. Infant mortality in Tel-Aviv is 57.01

per thousand, and the general death rate 25% of the births, whereas in Jaffa the death-rate is 50% of the births. Excellent care is given to children at the clinics, at the health centers, and at the nurseries for children of working mothers. The Women Workers' Council aids by distributing food in the kindergartens and milk in the schools.

Tel-Aviv is a city of many doctors. In fact, there are more doctors in proportion to the population than in any other city. In 1934 there was one doctor to every 250 persons in Tel-Aviv.

For a city so young hospitals and clinics are plentiful. The Municipal Hospital (formerly supported by "Haddassah" of America and now maintained by the municipality) contains 265 beds. This hospital is supplemented by 10 private hospitals. Another medical institution of importance is the Magen-David First Aid Station, operated entirely by volunteers.

In the three and one-half years it has been operating the First Aid Station has attended to more than 10,000 cases in the city and its environs.

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## Service Methods

### New Designs in Oiling Systems & Recent Research in Lubrication Discussed by Texaco Engineer

By Allen F. Brewer, Mechanical Engineer,  
Technical Division, The Texas Co.

**L**UBRICATING oil in a refrigerating compressor must do more than actually lubricate. It must resist reaction with the refrigerant employed and withstand chemical breakdown as far as possible. It is for this reason that the term *chemical stability* has come to be recognized as descriptive of the outstanding property in a lubricating oil designed for such work. Physical characteristics can usually be met in the refinery according to any of the specifications laid down by the compressor builders.

It might at first seem rather difficult for the refinery to consistently produce a light-medium viscosity oil having a pour test of say from  $-30^{\circ}$  to  $-40^{\circ}$  F. Actually this is only a matter of selecting the most suitable grade of crude and extending the process of refinement in order to remove those hydrocarbon components which would tend to cause the oil to congeal. The same holds true for practically any other physical specification.

#### Job for Chemist

None of these procedures, however, control the chemical stability. That becomes a function of the petroleum chemist in the selection of methods of refinement which will remove those unstable hydrocarbon components which would most readily tend to enter into chemical reaction with oxygen or the refrigerant to form tarry or gummy deposits.

It is the formation of such deposits which usually is the cause of difficulty in the operation of any such unit. For this reason many of the leading manufacturers of electric refrigeration and air conditioning machinery are devoting intensive research at this time to the study of the cause of such deposits.

It is all very well to attribute it to what the petroleum chemist terms the presence of unsaturated hydrocarbons.

The identification and segregation of these compounds is a difficult matter.

Normally one can hope to succeed only by a process of trial and error in the application of a wide variety of methods of test, and in studying the applicability of methods of selective refining to the numerous types of crude oils available for the manufacture of lubricating oils today.

Some of the most noteworthy research in this connection has led to the development and acceptance of a number of very interesting methods of test for the determination of the chemical stability of lubricating oils intended for refrigeration compressor service. In this way prediction of their durability can be more definitely made than by visual study of physical characteristics.

#### Terms Used

There are certain terms attendant to refrigeration and especially air conditioning which should be of interest. Many are technical. Some we used to know when we studied physics in school. All, however, may require discussion in consideration of compressor design and application of cooling equipment.

Refrigeration is understood as that process whereby heat is removed. The purpose of refrigeration is to bring about a condition of cold among materials, or within a confined space.

Heat is a form of energy. It is much the same as mechanical or electrical energy in its activity. In any

object where heat energy is intense or active, there is a condition of warmth which may range from the uncomfortable to the unbearable stage, according to the amount of energy involved. Where heat is absent there is a condition of cold, which by the same premise may be uncomfortable or unbearable if it is intense. Cold is brought about, then, by the removal of heat.

Heat can be distributed by conduction, convection or radiation. The direction of travel will always be from the warmer to the colder object. The greater the temperature difference between any two such objects the faster will be the rate of heat exchange. It is, of course, difficult to measure this rate of exchange without laboratory apparatus. Such apparatus is also essential for measurement of the amount of heat.

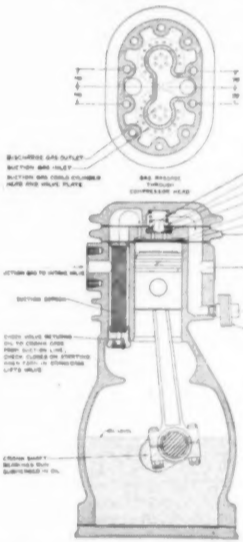
It is practicable, however, to determine the comparative intensity of heat at any point and at any time by a thermometer. Normally, this comparison is made with respect to the boiling or freezing point of water. It is a well known fact to all that heat as measured by the thermometer is indicated in degrees, according to the type of scale used; Fahrenheit being customary in English speaking countries, the Centigrade scale in turn being adopted to scientific work in foreign countries.

In turn, the quantity of heat is normally measured in terms of British thermal units in the United States and other English speaking countries; 1 B.t.u. being the amount of heat necessary to raise the temperature of 1 pound of water  $1^{\circ}$  F.

With an understanding of the relation of heat to refrigeration, one can now more clearly visualize the principles of refrigeration as based upon a change in state of a liquid or gas.

One is never working with any of these materials in solid form, but in the liquid and gaseous state. They must therefore be handled within

#### Lipman System



High oil level carried in the Lipman compressor makes possible a complete oil seal over shaft. A foaming regulator allows oil returning from the suction line to return to the crankcase.

tightly enclosed systems capable of withstanding considerable pressure due to the changes which occur.

These systems provide means for reclaiming the refrigerant after it has passed from the liquid to the gaseous state. They also enable control so that the refrigerant can be used repeatedly without loss.

Were a system of this type not used, the continued leakage of the refrigerant in its gaseous state would be not only costly but in some instances a violation of safety and fire laws.

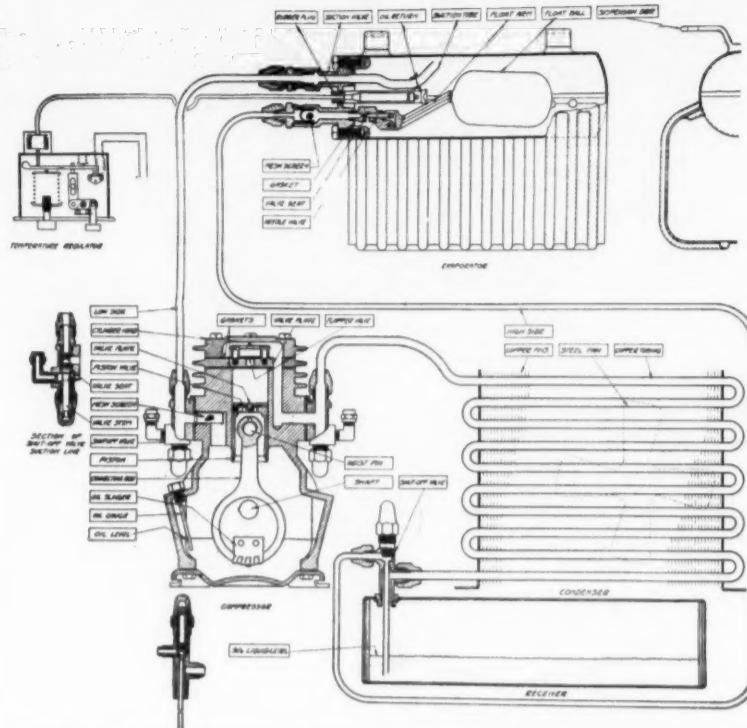
#### High and Low Sides

In view of the fact that we are dealing with both liquids and gases, there must be a high and low pressure side in every refrigerating system involving compression. Pressure is imparted to the refrigerant in the compressor, which is therefore partly on the high pressure side.

On the low pressure side the refrigerant is relieved of this pressure and allowed to expand. In this process of expansion heat is accumulated or absorbed, and refrigeration is thereby brought about. The cycle is completed by return of the refrigerant to the compressor.

Compression, whereby the gas is crowded into a much smaller space, results in an increase in temperature. Cooling of this gas involves one of the stages following compression. It is known as condensation, and may be accomplished either by water or air, according to the design of the unit. Sufficient cooling must be available to reduce the gas completely to a liquid state prior to the process of expansion. The above holds true regardless of the type of refrigerant.

#### Stewart-Warner Cycle



Details of S-W refrigerating system. Special oil slinger paddles attached to the eccentric splash oil onto cylinder walls and other working elements.

There are three essential parts to the modern refrigerating system:

1. The refrigerated fixture.
2. The cooling unit, and
3. The condensing unit.

The refrigerated fixture is the box, cabinet or cooler in which materials such as foodstuffs, furs, etc., are to be stored and preserved. It must be constructed in such a manner, and of such materials as to provide maximum resistance to heat transfer from any outside source. The more effective the insulation the more constant will be the operation of the compression unit, likewise the more economical.

The cooling unit, in turn, is the mechanical contrivance which replaces the cake of ice in the conventional ice box. R. J. Thompson refers to it as an absorbent or sponge, so to speak, for it soaks up the heat that is contained in the interior of the cabinet or in the material to be cooled.

The cooling unit is normally an arrangement of coils designed to enable maximum refrigeration by rapid transfer of heat from the space within the cooler or cabinet to the refrigerant. This transfer of heat is brought about by boiling or vaporization of the latter in the coils.

The condensing unit is a heat exchanger designed for removing heat from the system which has been absorbed from the air or materials within the refrigerator by the cooling unit. The compressor serves as the medium for reclaiming the

gaseous refrigerant; the condenser for restoring it to its liquid state so that it can be used over again.

There are three types of compressors in common use in refrigeration and air conditioning service today, notably the reciprocating, rotary and centrifugal. Normally the type which can be used is dependant upon the boiling point of the refrigerant and the pressures which the resultant gases produce at various temperatures.

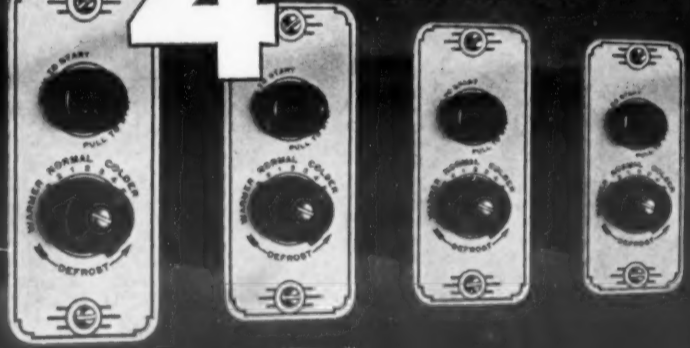
#### Boiling Points for Types of Compressors

Under normal operating conditions, Mr. Thompson advises that the reciprocating compressor can successfully be used with refrigerants having boiling points of less than  $15^{\circ}$  F., the rotary type with refrigerants of boiling points ranging from  $10^{\circ}$  to  $75^{\circ}$  F., and the centrifugal units with a boiling point range of from  $70^{\circ}$  F., and above.

In addition, the type of compressor must be studied with respect to the pressure characteristics of the particular liquid refrigerant to be used; the reciprocating type being best adapted to refrigerants which operate at positive pressures, the rotary type, in turn, being used with those which can be handled very close to atmospheric pressure, while the centrifugal machine is applicable to refrigerants which must be handled under a vacuum or under negative pressure.

There is always a certain amount of suction action at the compressor. (Continued on Page 15, Column 1)

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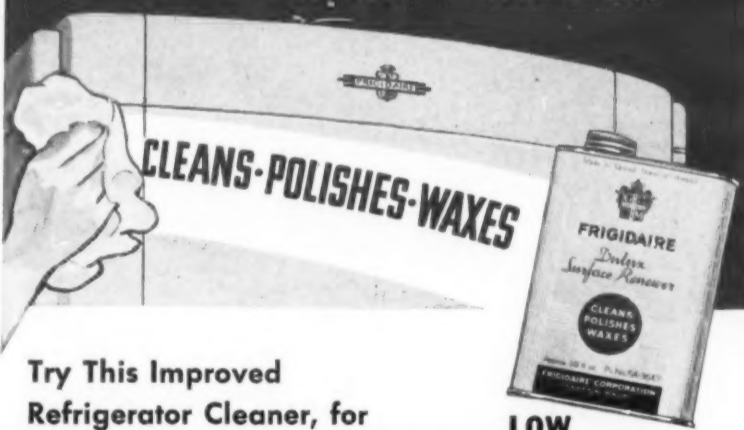
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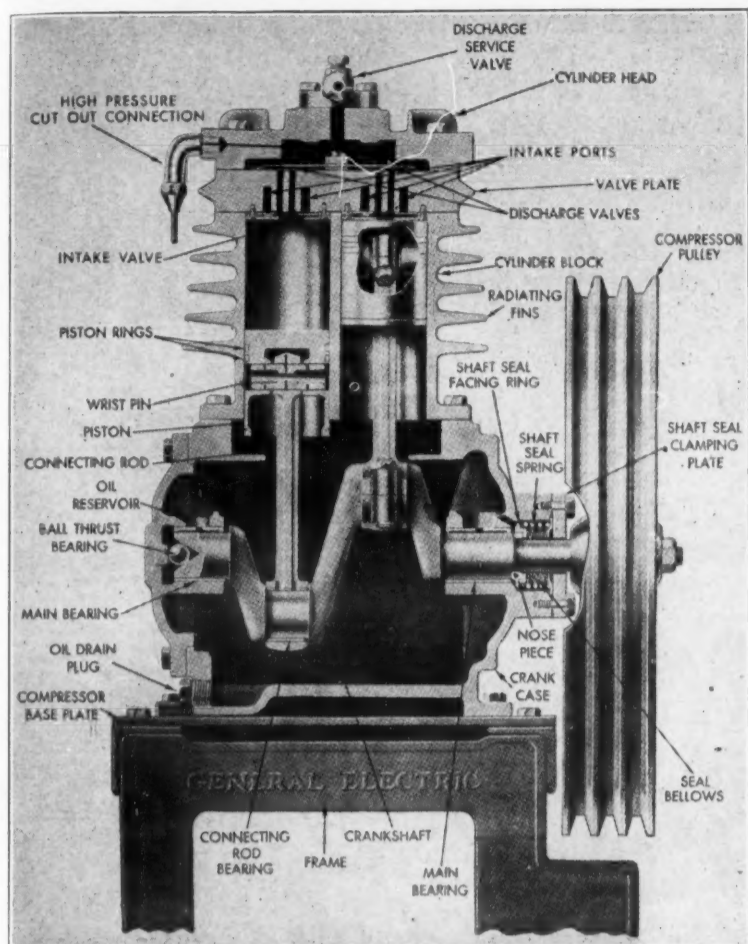
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## Lubricating Elements in G-E Compressor



Sectional view of the G-E compressor (model CM). Note the bearing design and relative location of the lubricated elements.

## Lubricating Methods In Present-Day Units

(Continued from Page 14, Column 5)

This reduces the pressure in the cooling coil, enabling the liquid refrigerant to boil more freely and furnish an abundance of gas for carrying away heat units which have entered the cooling coil.

With this reduction in pressure, the boiling or vaporization point of the refrigerant is accordingly lowered, vaporization in the coil taking place vigorously while the machine is operating.

Reference has been made above to the high and low pressure sides of the refrigerating system. It is well to note the dividing points.

Normally these are the discharge valve in the compressor and the needle or expansion valve adjacent to the receiver. The refrigerant gas, after it has been compressed by the piston or rotary mechanism of the compressor, is forced through the discharge valve into the condenser.

As this occurs the temperature is raised considerably above that of the surrounding media. Heat units then begin to pass from the gas to the cooling medium in the condenser.

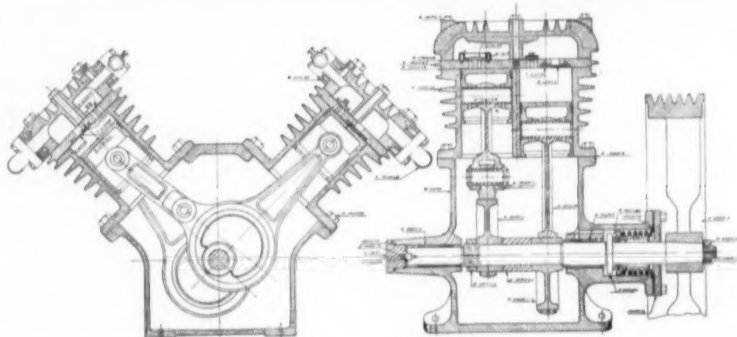
Heat is extracted and the refrigerant gas is changed back into the liquid state, in which form it flows into the receiver or sump tank, and thence via a liquid line through a needle or liquid control valve, a suitable float valve or an expansion valve.

From here on during the cycle we are dealing with the low pressure side. In other words after the liquid refrigerant has passed the liquid or expansion valve, it is admitted into the cooling coil as required, to replace

the liquid refrigerant which has been evaporated. Here it can expand or vaporize in accordance with the amount of heat which is carried to it from within the refrigerator. This heat-laden gas then passes via the suction line to the compressor for recompression and recirculation.

The compressor plays another part by virtue of being able to change the pressure on the surface of the liquid refrigerant in the cooling unit. This

## F-M Air-Conditioning Compressor



Sectional view of a Fairbanks-Morse compressor for air-conditioning work. Lubrication is by the splash system. Large bearing surfaces are involved, and oil is circulated by the churning action of the eccentrics.

of course will have a direct bearing on the temperature, which can be governed by a suitable control.

These latter elements influence the operation of the compressor within certain definite predetermined points, causing it to start operation as soon as the temperature has reached the higher limit, and to stop when the temperature has been reduced to the lower limit.

## Lubrication Procedure

Lubrication of the condensing unit, as applied to either electric refrigeration or air conditioning, is a function of the builder at the time of manufacture. Normally it is taken care of on the production line at the time the system is being dried.

If production is extensive, some builders may dehydrate their oil simultaneously to take advantage of purchasing in bulk. Others prefer to handle lubricating oil in sealed containers with the responsibility for dehydration being assumed by their oil company. This latter practice is widely customary in servicing units after they have been placed in operation. As a result, the owner or operator is normally relieved of the responsibility of lubrication.

In other words, all machines as they leave the manufacturer's plant are lubricated with an adequate charge of oil which, barring unforeseen developments, should be capable of maintaining lubrication for a period of two years or longer, according to the operating condition.

When re-lubrication is necessary this normally becomes a part of the service procedure. Uniformity in lubrication is assured and the possibility of use of an unsuitable oil by any machine owner is entirely eliminated.

It has been essential for the builders to follow such a procedure due to the properties of the various chemicals used for refrigeration. In the presence of unsuitably refined oils which may not be of adequate chemical stability, objectionable deposits may be formed which may impair free circulation of the oil and lead to mechanical difficulties due to the extremely low clearances which customarily are used.

Another factor which imposes a comparatively severe requirement upon any oil used for electric refrigeration service is that in addition to lubricating the compressor mechanism, it must serve also as a cooling medium for the stator windings in some types of machines. In such units the same oil also lubricates the motor bearings.

Certain refrigerants are completely miscible with petroleum lubricating oils. In air conditioning service we are particularly concerned with Freon and to some extent with Carrene and methyl chloride, although there is a considerable number of other refrigerants of halogenated hydrocarbon nature, or (as the chemist terms

them) the halo-fluoro derivatives of aliphatic hydrocarbons, which must be considered.

## Relation of Compressor Design

Extent to which the compressor oil in a refrigerating or air conditioning system may come into appreciable contact with the refrigerant will of course depend upon the type of compressor. The centrifugal machine, as designed for air conditioning service, presents a comparatively simple problem involving the lubrication of ring-oiled bearings and the maintenance of a seal against loss of vacuum. Normally a certain amount of transfer of refrigerant from the refrigerating system to the lubricating system takes place due to the absorption of refrigerant by the oil.

Because of the redistillation that is provided during operation, this absorption of refrigerant in the oil will not be sufficient to give any concern as to the resulting lubricating ability of an oil which has been specially refined for this class of service.

The method of lubrication is of more importance in the reciprocating machine. Small tonnage units designed for splash lubrication, as are so many of the unit type reciprocating railway or household machines, depend upon oil thrown from the crank to splash to the cylinders.

Some of this oil is bound to pass over to the high pressure side and become mixed with the refrigerant. For this reason there is provision for return of the refrigerant vapors and oil directly to the crankcase.

In such machines an oil level regulating device is frequently installed, although if care is observed not to

(Continued on Page 16, Column 3)

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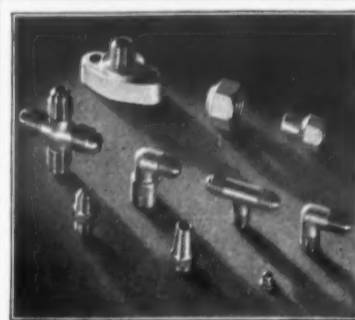
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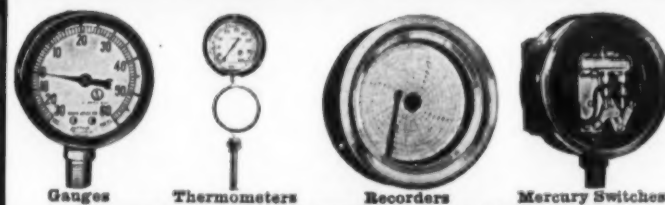
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## Characteristics of Various Types of Oiling Systems

(Continued from Page 15, Column 3)

charge the compressor with too much oil to begin with, the oil level regulator may not be necessary; it is not always used on the small household type of machine.

Of more importance is the oil separator and its relative location, especially when using a refrigerant which is miscible with oil to cause reduction in viscosity.

On the other hand, the reciprocating compressor can be built so that the refrigerant vapors are kept entirely apart from the crankcase. In such machines the possibility of mixture with oil at this point at least is largely eliminated. This enables the oil to maintain its original viscosity or to follow the normal reduction in viscosity which would take place as the crankcase comes up to average operating temperature.

The enclosed crankcase machine equipped with trunk type pistons and designed for pressure lubrication is typical of the above. The oil pump maintains positive circulation of oil without splash effect and foaming is not as pronounced.

This reduction of oil splash in turn reduces the tendency of any refrigerant present to mix the oil supply, especially as there is no circulation of refrigerant vapors within the crankcase.

Location of the oil pump in such a machine must of course be carefully studied; authorities recommend that it be at the lowest point in the case to insure against loss of suction and the resultant reduction in volume of oil circulated which might readily lead to impaired lubrication. Obviously, the more positive the oil circulation the more constant will be the pressure on the resultant oil films.

The cross-head type of reciprocating compressor is adaptable to large tonnage central-station air conditioning service. In this unit the refrigerant vapors are kept out of the base or crankcase of the machine, apart from the compressor end. Instead they are returned directly to the cylinder block.

As a result there is no possibility of the oil in the case becoming mixed with refrigerant, the possibility of foaming is reduced along with artificial reduction in viscosity.

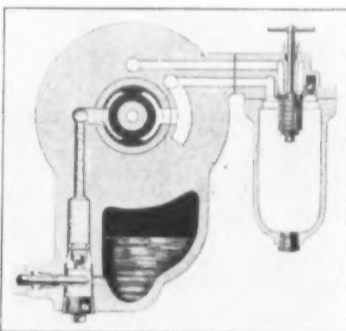
Since lubrication of the crankcase elements or external parts is maintained entirely independent from the cylinders, it is customary to provide for injection of a certain amount of oil into the refrigerant return line to take care of piston and valve lubrication and protection of the cylinder walls against scoring.

In such machines automatic circulation of lubricant to the external parts is the usual procedure, using straight mineral oil of medium viscosity. High grade engine or machine oil normally will serve this purpose.

## Types of Lubricating Systems

Methods of compressor lubrication have been most carefully studied in the development of the unit type air conditioning or refrigerating compressors.

### Vilter's Pump



Oil pump in a Vilter Freon compressor. Unit is of hermetically internal design, pump being of the automatic reversal gear type mounted at end of main bearing.

sor. With automotive experience as a background, and the comparatively successful results obtainable from splash lubrication as it was used when the electric refrigeration industry first came into prominence, it was logical that this means of lubrication should first be favored. It has proved its dependability and economy, and still is preferred by many builders.

Recently the adaptability of pressure has been the subject of considerable research, designed to function either alone or together with splash. The objective has been to obtain positive circulation of oil throughout the compressor and to eliminate foaming as far as possible.

Obviously in a splash lubricated reciprocating compressor, foaming will

## Universal Cooler Cycle

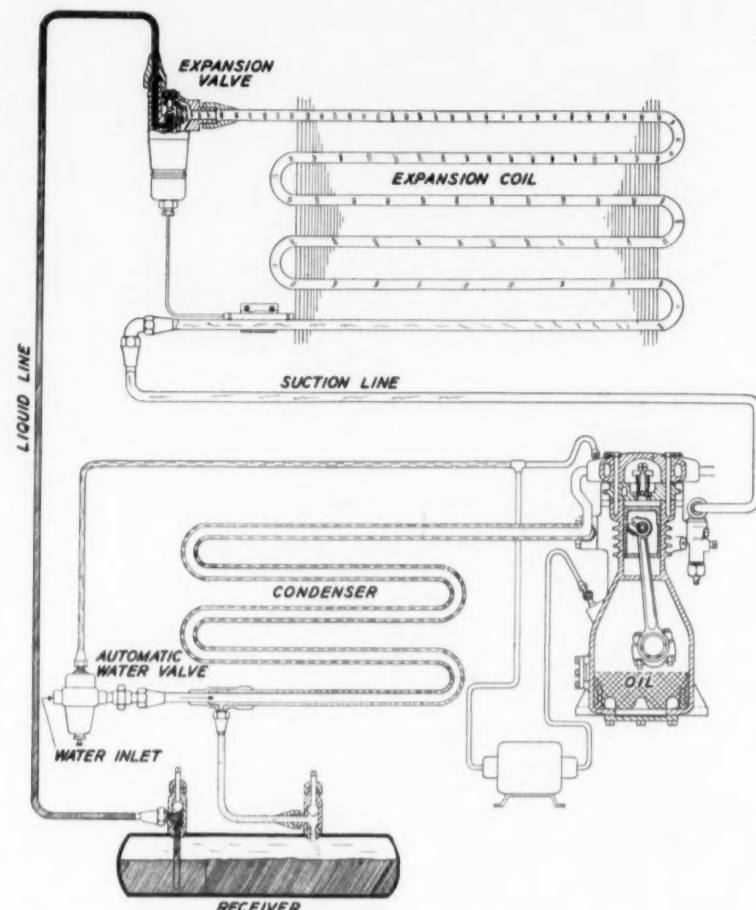
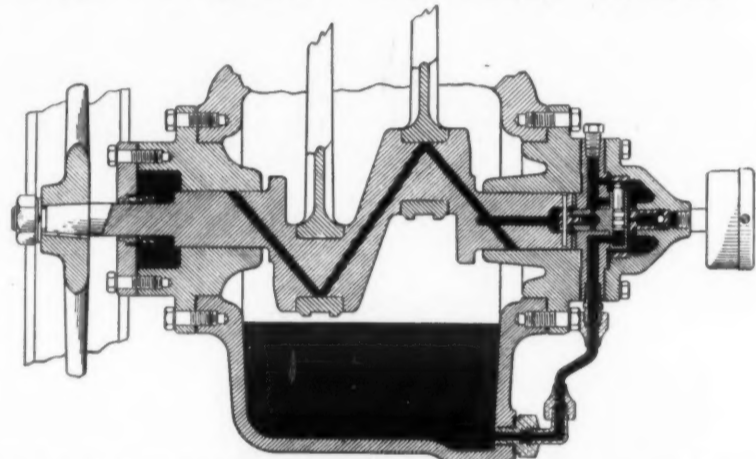


Diagram of the Universal Cooler refrigerating cycle. All refrigerant gases and vapor are excluded from the crankcase, which holds only the lubricating oil, and the oil mist from the crankcase splash.

## How Williams' Oil Pump Works



In the Williams Ice-O-Matic compressor the oil pump is connected to and rotates with the crankshaft.

always be present. The extent to which it may be objectionable will depend upon the oil level and the location of the suction valves. The unit type of compressor takes its suction through the crankcase; if the foam level rises to a sufficient degree, foam may be carried over with the refrigerant to cause serious retardation of heat transfer. If allowed to continue cleaning of the system may be necessary, the attendant expense of which is objectionable.

### Principle of the Gear Pump

Pressure alone, by means of the automotive type of gear pump for oil distribution, also has proved adaptable to the refrigerating compressor.

The typical gear pump, as designed for positive delivery of oil, is a comparatively simple device consisting of a pair of gears mounted in a suitable housing. The normal location of such a pump is in the base of the crankcase of the compressor, some designers preferring to place this pump at the lowest part of the case.

Others are of the opinion that the pump should be set just above a depression or catch basin in the case to trap foreign matter and prevent it being circulated through the lubricating system. Usually, however, foreign matter in a well designed system using properly refined oil will be conspicuous by its absence.

Irrespective of the location of the pump, suction is automatically maintained by gravity, since the pump is below the normal oil level. The discharged oil, under pressure according to the speed of rotation of the gears and their relative tooth dimensions, is led from the discharge side of the pump to the connecting rod bearings and other elements by drilled passages and suitable piping connections.

As oil passes out from the bearing clearance spaces, or drips from the cylinder walls or other parts of the interior housing, it returns to the case of oil sump by gravity for recirculation.

### Rotary Pump Operation

The principles of rotary motion are involved in the floating blade type of oil pump. Two blades, free to move in a slotted rotor, serve as the pumping media. In the General Electric design this rotor is fixed to the lower end of the vertical motor shaft.

The oil is carried in the base of the unit, being drawn up and pumped through a passage drilled in the motor shaft and thence through other passages to the yoke arrangement and lower shaft bearings. The majority of the oil goes to the cylinder wall. On leaving these elements part of this oil returns to the base, the remainder flowing through the stator of the motor to cool the windings.

(Concluded on Page 18, Column 4)

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# COMMERCIAL Service Manual

By K. M. NEWCUM

## Use of Dryers in Commercial Refrigeration Systems

### Chapter 5

#### Drying Refrigerants

Much has been written and many tests have been made both in laboratories and in the field for drying refrigerants. The results vary according to the individual unit or system being dehydrated. Individual opinions differ as to the results obtained with different drying agents or methods of dehydration.

Following are some of the facts about dehydrating refrigerating systems:

#### Problems with Sulphur Dioxide

The manufacturers of SO<sub>2</sub> plainly state that they have been unsuccessful in drying SO<sub>2</sub> as a liquid. During the process of manufacturing SO<sub>2</sub> it is dehydrated while in the form of gas.

It is also known that when water mixes with SO<sub>2</sub> it immediately forms a solution of sulphurous acid, which immediately attacks all ferrous metals.

From the above it would seem impracticable to dehydrate an SO<sub>2</sub> system in which moisture has been noticed. By the time the presence of moisture has been noticed it has already done its damage by using up its acid strength in attacking the ferrous metal parts of the system.

#### Drying SO<sub>2</sub> Cylinders

SO<sub>2</sub> manufacturers use dry SO<sub>2</sub> for drying wet SO<sub>2</sub> cylinders. When each cylinder is returned to the factory the valve is removed and completely reconditioned. The cylinder is tapped on the outside to loosen any dirt or scale from the inside. It is then blown out with live steam to remove all foreign materials. The valve is then reinserted and a high vacuum is drawn.

With the vacuum drawn on the cylinder it is then partially charged with dry SO<sub>2</sub>. This SO<sub>2</sub> is washed around in the cylinder, then run off.

The operation is repeated 3 or 4 times. After these cleaning operations the cylinder is filled with dry SO<sub>2</sub> and its contents analyzed.

Manufacturers who do this explain that dry SO<sub>2</sub> is the best chemical or material known to absorb water and oil.

This same procedure can be followed in drying systems on the job, as in fact has been done. The entire charge of SO<sub>2</sub> and oil should be removed from the system and a complete new charge of dry SO<sub>2</sub> put in. The charge should be left in the system for not over one day. This discharging and recharging operation should be repeated until by test the system is free of all moisture.

#### Type of Oil Used

Concerning this problem of dehydration, more consideration should be given to the oil used. Few service men seem to realize that oil can and does absorb moisture when exposed even to the driest atmospheric conditions.

The larger manufacturers of refrigeration equipment have learned from experience that the oil problem requires considerable attention. First, the very best oil obtainable is not too good for refrigeration systems. Second, it should be left in small sealed cans up to the time for actual use.

The amount left over should be placed in a tightly sealed can. If the container is not tightly sealed, by the time the oil is to be used again it may have absorbed considerable moisture.

Drying of systems using methyl chloride or Freon is not as difficult as with SO<sub>2</sub> for under ordinary conditions the water does not mix with

either of these two refrigerants. They are dried during their manufacturing process in the form of a vapor.

There are several drying agents commonly used in dehydrators for these refrigerants.

#### Characteristics of Drying Agents

In the system the problem is to dry the liquid. There are several points to consider. First, any of several drying agents such as calcium chloride, calcium oxide, Activated Alumina, Silica Gel, and Drierite, have a capacity to absorb moisture providing they are absolutely dry when introduced into the system.

Second, these drying agents make the most of their capacity when pure liquid is passed very slowly through or over the agent.

Third, these drying agents are like sponges and soak up the first thing that comes along. In the liquid line their pores are filled with liquid refrigerant and then coated with oil. This condition materially reduces their moisture-absorbing capacity. It is thus difficult to determine how much moisture a known quantity of dehydrating agent will absorb. Fourth, a large amount of the moisture may be trapped in the form of ice in the evaporator. This ice will remain frozen to the walls of the tubing or header so long as the evaporator temperature is below freezing.

Fifth, some drying agents break down into a brine solution in the presence of a sufficient amount of water. Calcium chloride is known to do this. This solution is very damag-

cases, that the drying agent is not saturated with oil.

Silica Gel, like Activated Alumina, does not break down into powder or brine. It does slough off slightly in rough handling or in shipment. This powder may be trapped by a highly efficient filter.

Drierite has the same general features as Silica Gel and Activated Alumina.

The problem of dehydration then is to provide a sufficient quantity of bone-dry drying agent and to fortify this agent with the best filter obtainable. A line valve should be installed ahead of the dryer to restrict the flow of liquid through the dryer, slowing it down to come in contact with the agent sufficiently long to give up its moisture—and to keep all parts of the system warm during the dehydration period, to make possible the removal of all moisture during this period.

#### Length of Time Used

The length of time a dryer should be left in the system depends largely on the drying agent used and the procedure followed. If the amount of drying agent used is far more than necessary for the maximum amount of water possibly present in the system, and if the drying agent is trapped with a good filter, the dryer can be left in the line indefinitely.

If the dehydration is to be done as previously described, that is by slowing down the liquid and keeping the entire system warm, one or two days at the most should be sufficient for the entire operation.

Some companies follow the practice of putting in one cc. of methyl alcohol for each pound of refrigerant in the system. Methyl alcohol lowers the freezing point of the water in the system to prevent its freezing at the float or expansion valve needle.

#### Absorb Atmospheric Moisture

Drying agents, like oil, absorb moisture from the atmosphere. They should be purchased in small sealed containers and kept sealed until put into the system. If any drying agent is left exposed to the atmosphere for several minutes it should be discarded, for its capacity for absorbing moisture from the system is considerably reduced.

A dryer should not be used on

### Kerotest Flanged Dryer

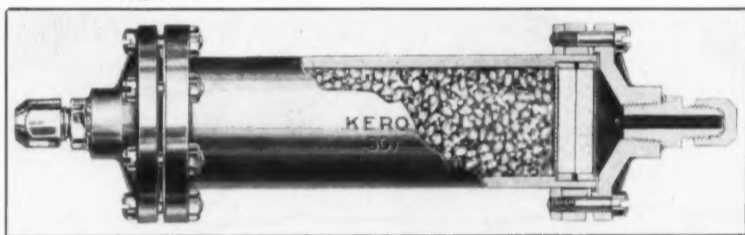


Fig. 28—Kerotest flanged type dryer with removable ends.

ing to the system. However, calcium chloride will not break down into brine in the presence of a small amount of moisture.

#### Calcium Chloride

Calcium chloride then may be a satisfactory dehydrating agent providing, first, that it is completely devoid of moisture when placed in the system, and second, that a sufficient amount of dry calcium chloride is put in the dryer to provide a capacity to absorb many times more moisture than the system possibly could contain.

When calcium chloride has absorbed sufficient moisture it breaks down not into a brine but into a powder. The powder is troublesome as it will clog orifices and strainers throughout the system. Here again if a large amount of dry calcium chloride is put in a dryer and fortified by a highly efficient filter it will serve good purpose as a drying agent.

#### Activated Alumina

Activated Alumina does not break down either into a brine or a powder, but it does slough off slightly. The powder formed in sloughing off can be trapped by fortifying the drying agent with a highly efficient filter. A sufficient quantity of Activated Alumina placed in a system will remove the free moisture that comes in contact with it provided, as in all other

more than one job without being recharged with a new bone-dry drying agent. If the dryer has been used or left exposed to the atmosphere, it may quite possibly give off moisture to the system instead of absorbing moisture. If the dryer is charged when purchased it should be examined to make sure the seal caps or plugs are tight. If the caps or plugs are loose the condition of the drying agent is questionable.

Several dehydrators now on the market are illustrated in Figs. 27, 28, 29, and 30. Fig. 27 shows the Fedders dehydrator furnished for use with 1/4-inch liquid lines. One end of this dehydrator is soldered at the factory while the other end is easily removed for filling with the drying agent. After charging the end should be sealed with solder. Both ends are equipped with filters as illustrated.

Fig. 28 shows a Kerotest flanged type dryer with removable ends. Either end may be easily removed on the job by removing the small bolts.

Both ends are equipped with filters as illustrated. This dryer is obtainable in sizes 1/4-inch SAE and 3/8-inch SAE. Like the Fedders dryer shown in Fig. 27 it is supplied unchanged.

Fig. 29 shows the McIntire DFN. This dryer is equipped with a renewable cartridge as illustrated. The cartridge contains Activated Alumina for drying, a series of screens and

### Two McIntire Dehydrators

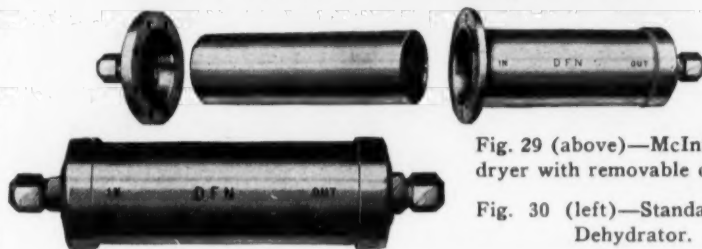


Fig. 29 (above)—McIntire DFN dryer with removable cartridge.

Fig. 30 (left)—Standard DFN Dehydrator.

metallic wool for filtering, and a metallic agent for neutralizing.

The flanged end type shown in Fig. 29 equipped with renewable cartridges is supplied in several sizes to accommodate various-sized compressors—as follows:

For Comp. Size	Dimensions O.D. Overall Tube Length	Male SAE Tube Connection	No. of Cartridges Used
1 hp.	2" 8 1/4"	1/4"	1
1 1/2 hp.	2" 13 1/4"	1/4"	2
2 hp.	2" 14 1/4"	3/8"	2
3 hp.	2" 19 1/4"	3/8"	3

The renewal cartridges are packed in moisture-tight containers to make

replacing on the job a convenient operation.

The standard type DFN shown in Fig. 30 is charged with the same materials as the refill cartridges. They are obtainable in sizes and capacities to fit systems from 1/4 hp. to and including 20 hp.

### Service Men Finish Course At Crosley Factory

CINCINNATI — Six service men affiliated with Crosley dealers and distributors recently completed the factory service course given by Crosley Radio Corp. here.

## The Buyer's Guide

Suppliers Specializing in Service to the Refrigeration and Air Conditioning Industries

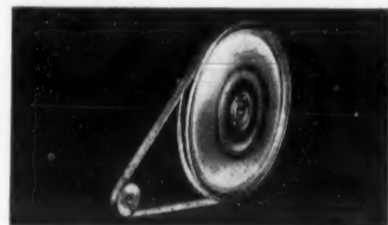
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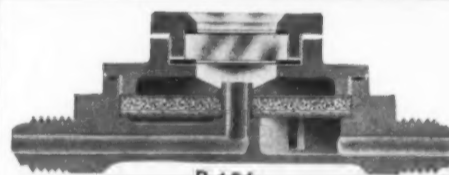
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### Fedders Dehydrator

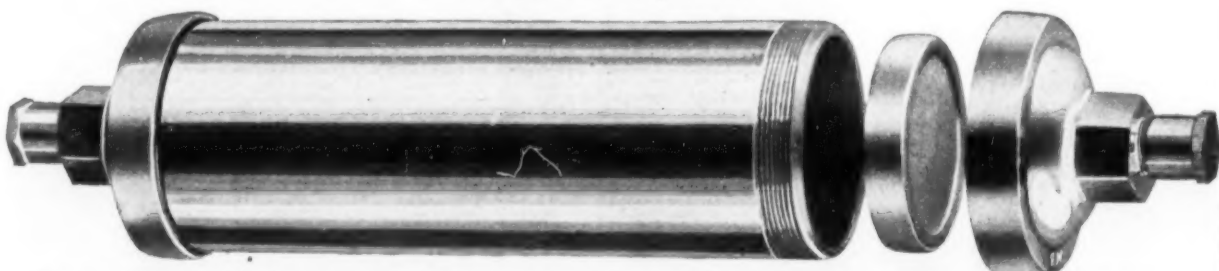


Fig. 27—Fedders dehydrator for use on 1/4 inch liquid line. The removable end should be sealed with solder after filling with the drying agent. The dehydrator is 8 1/4 inches long and 2 1/8 inches in diameter.



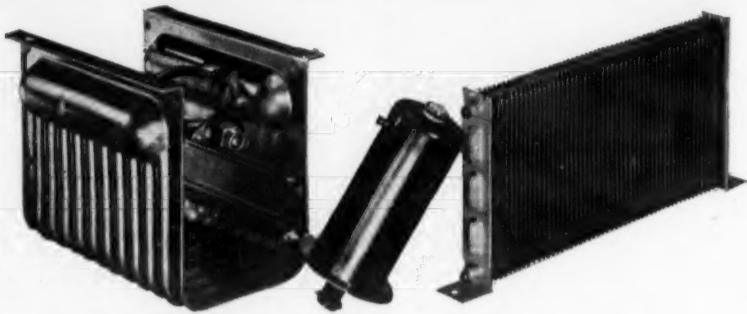
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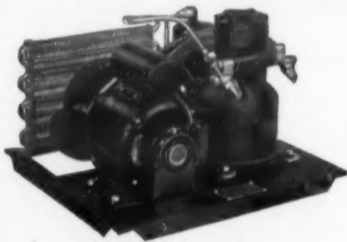
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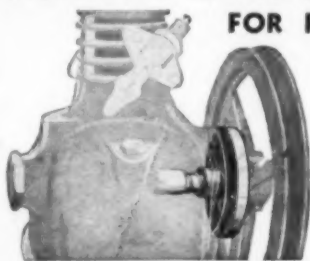
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## Chemical Effects Of Lubricants On System

(Concluded from Page 16, Column 5)

Another type of oil pump which has been studied in connection with commercial refrigerating units is the oscillating cylinder type of reciprocating mechanism. This is of single cylinder design, operated from an eccentric on the end of the crankshaft. The entire assembly is so located as to be readily accessible for inspection without removal of other parts.

The pump is designed to supply oil under pressure directly to the two main bearings. From here oil is passed through holes in the crankshaft to the connecting rod bearings, center bearing and shaft seal. A part of this oil is pumped through tubes to the piston pin bearings. The cylinder walls in any machine equipped with this type of pump are splash lubricated.

### The Chemistry of Refrigeration

Of the several chemicals used as refrigerants in air conditioning and refrigeration, sulfur dioxide, methyl chloride and Freon (dichlorodifluoromethane) require the most careful attention from the viewpoint of their potential effect upon petroleum lubricating oils through chemical reaction.

Sulfur dioxide in the presence of slightly more than a trace of water will react chemically to form corrosive acids. Where the lubricating oil has not been carefully refined to render it as chemically stable as possible, there is a possibility of breakdown of its hydrocarbon structure in the presence of sulfur dioxide.

This will result in sludge formation and accumulation of gummy material which will seriously impair the operation of the unit and especially the distribution of the lubricant. High dielectric strength as an indication of freedom from water is therefore a most important property in an oil to be used with sulfur dioxide.

In air conditioning work Freon and Carrene have become practically the universal refrigerants, the former being especially adaptable to the unit type machine and for railway service. Lubrication of a reciprocating or rotary type compressor operating on Freon requires a thorough understanding of the fact that this refrigerant is entirely miscible in straight mineral lubricating oils.

As a result of this characteristic of Freon there is a decided reduction in the viscosity of the ultimate mixture. Until quite recently the trend in the petroleum and refrigerating industries has been to select a lubricant of considerably higher viscosity than would normally be called for in the lubrication of compressors of the same capacity operating on some of the other accepted refrigerants.

Lately certain authorities among the manufacturers of air conditioning machinery in particular have become convinced that the Freon-lubricating oil vapor, as developed in the operation of an air conditioning unit, has an appreciable lubricating value.

In order to prove this point and to eliminate the possibility of unnecessary increase in power consumption by use of too heavy an oil, practical study of this problem has recently been inaugurated.

Data to date indicates that in average railway, commercial and household air conditioning service it is advisable to regard approximately 500 seconds Saybolt Universal viscosity at 100° F. as the probable maximum viscosity.

Tests on lighter oils have indicated that in all probability this viscosity can be somewhat reduced, especially if the oil is highly resistant to chemical breakdown and the formation of non-lubricating deposits on the moving parts.

Lubricants for such service consequently are regarded as specialties. The need for this is enhanced by the desirability of eliminating as far as possible chemical reaction with any of the metals, alloys or fabrics used in the manufacture of the compressor or refrigerating system.

In some instances reaction of this sort might be comparatively harmless. In others, permanent damage to the system may result with leakage perhaps of toxic vapors, loss of refrigerant, or at least objectionable odors from certain types of gasket materials.

This has called for the development of certain types of breakdown tests wherein these materials are exposed to lubricating oil and the refrigerant, frequently under operating pressures and temperatures, over a considerable period of time.

These tests make possible laboratory observation of the ability of the oil under test to withstand breakdown. In effect this becomes a measure of the degree of refinement. The latter has been erroneously overstressed in the manufacture of certain

types of virtually colorless oils for refrigeration purposes. Advances made in the study of oxidation of petroleum products has indicated that over-refinement may increase the susceptibility to breakdown and markedly reduce the lubricating value.

### Foaming

Foaming, while not a chemical reaction, requires consideration whenever the oil is to be used in a sealed machine, and where it functions as a coolant for the motor windings as well as a lubricant for the moving parts.

Usually an excess of oil is circulated in machines of this type by means of a suitable pumping device. It is this excess which serves as the cooling medium during the course of circulation through the unit.

Abnormal tendency to foam with the refrigerant will reduce this cooling effect. In addition, if too much foam accumulates an excessive amount of oil may be carried over into the receiver and into the low pressure side of the system.

Foaming is most apt to occur with refrigerants which are miscible with straight mineral lubricating oils when the former, in vaporous form, are absorbed and condensed in the oil. On the other hand it is also apt to occur with sulfur dioxide. In each case it becomes most evident if the unit is overcharged with oil, and there is possibility of excessive splashing or too active circulation.

The tendency of any petroleum lubricating oil to bring about the above reactions is more or less a measure of the method of refinement. In the interest of reducing the corrosion tendency it is especially essential that the water content be practically nil; this is necessary also to prevent freezing at the regulating valve and possible restriction of flow of refrigerant. Water would freeze in the cooling coils, reducing evaporative efficiency.

In the hermetically sealed machine a dehydrated oil is also advisable to prevent possible chemical dissociation of the refrigerant in event of a short circuit, which can lead to serious damage to the machine parts through acid formation.

## Questions

### Blower & Air Filter Units

No. 2893 (Dealer, Illinois)—"Will you please give us names of manufacturers of blower and air filter units that can be attached to warm air furnaces?"

Answer: Manufacturers of winter air-conditioning systems are listed in the July 29 issue of ELECTRIC REFRIGERATION NEWS, in which were published specifications of winter conditioning units.

### National Unit Parts

No. 2894 (Dealer, Pennsylvania)—"Please advise make and model of compressor used on National Domestic Refrigerator, compressor plant Model No. F-1, and where compressor parts can be bought?"

Answer: Write the receiver for National Refrigeration Corp., Charles E. Brennan, Dayton, Ohio, for any information on their compressors or compressor parts.

The MASTER SERVICE MANUAL gives service information on all types of household electric refrigerators.

### Bulls Eye Glass

No. 2895 (Manufacturer, New York)—"Can you tell us the source of supply for round plate glass disc 1/4 inch thick and 7/8 inch in diameter, to be used for bulls eyes liquid refrigerant indicators?"

Answer: Similar glass discs are used on the Kerotest and Mueller liquid line sight indicators.

Answer: Contact the following manufacturers:

Eclipse Glass Co., Inc.  
N. Main St., Thomaston, Conn.  
Demuth Glass Works, Inc.  
N. 12th St. & Wyeth Ave., Brooklyn, N. Y.  
Charles L. Schmiedeckne  
69th St. & Metropolitan, Maspeth, N. Y.

### Truck Cooling Units

No. 2896 (Manufacturer, Wisconsin)—"One of our good export customers has asked that we try to secure for him a quotation on cooling equipment for motor trucks, and we would thank you to advise us regarding prospective sources for such equipment. We manufacture electric household models here and some commercial models of the remote condensing unit type, but have never offered anything in a portable truck cooling equipment, and are not sure who to correspond with regarding same."

Answer: Manufacturers of portable truck cooling equipment are listed on page 208 of the 1935 REFRIGERATION AND AIR CONDITIONING DIRECTORY.

### Lipman Address

No. 2897 (Dealer, West Virginia)—"Please give to us the address of the Lipman people who manufacture commercial refrigeration."

Answer: Lipman commercial refrigeration equipment is made by General Refrigeration Sales Co., Beloit, Wis.

### Mohawk Manufacturer

No. 2898 (Dealer, Missouri)—"I desire to get the mail address of the designers and manufacturers of the 'Mohawk' electric refrigerating unit and compressors, and refrigerators."

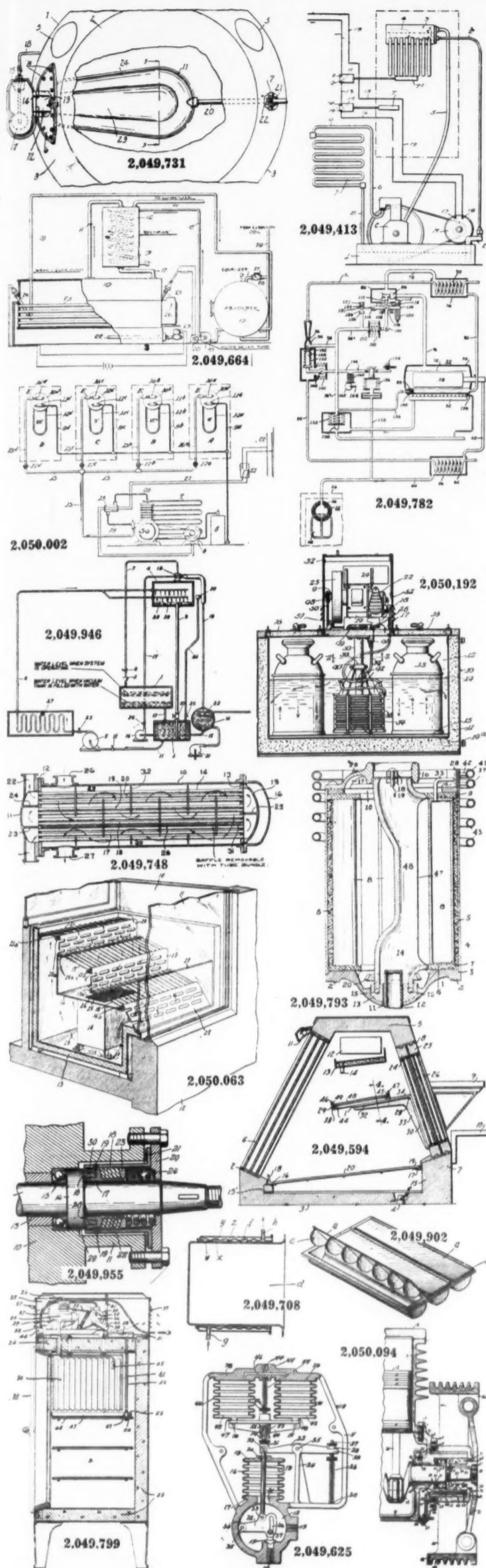
Answer: Mohawk refrigeration systems were manufactured by the Rudolph Wurlitzer Mfg. Co., Falls Blvd., North Tonawanda, N. Y.



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2,049,748. HEAT EXCHANGER. John P. Rathbun, Prospect Park, Pa., assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Application July 7, 1934. Serial No. 734,095. 3 Claims. (Cl. 257-239)

2,049,782. REFRIGERATING APPARATUS. Harry F. Smith, Dayton, Ohio, assignor, by mesne assignments, to General Motors Corporation, Application September 13, 1929, Serial No. 392,341. Renewed November 16, 1934. 28 Claims. (Cl. 62-5)

2,049,793. REFRIGERATING APPARATUS. James C. Armor, Bellevue, Pa. Application July 26, 1932. Serial No. 624,761. 7 Claims. (Cl. 62-118)

2,049,799. REFRIGERATING APPARATUS. Robert R. Candor, Dayton, Ohio, assignor to General Motors Corporation, Dayton, Ohio. Application January 23, 1935, Serial No. 3,136. 13 Claims. (Cl. 62-116)

2,049,902. ICE TRAY. Albert C. Fischer, Chicago, Ill. Application February 15, 1932. Serial No. 593,025. 6 Claims. (Cl. 62-108.5)

2,049,946. REFRIGERATING SYSTEM. Christoffer Christofferson, New York, N. Y. Application September 21, 1934, Serial No. 744,880. 8 Claims. (Cl. 62-152)

2,049,955. SHAFT SEAL. Walter Gilbert, Sr., Johnstown, Pa. Application July 25, 1935, Serial No. 33,143. 2 Claims. (Cl. 286-7)

2,050,002. REFRIGERATION SYSTEM. James W. Gilbert, Johnstown, Pa., assignor of one-half to Ernest F. Walker, Johnstown, Pa. Application October 6, 1934, Serial No. 747,172. 7 Claims. (Cl. 62-115)

2,050,063. REFRIGERATED STORE WINDOW. Arthur T. Millott, Euclid, Ohio, assignor to General Electric Company. Application March 7, 1935, Serial No. 9,766. 12 Claims. (Cl. 62-89.5)

2,050,094. COMPRESSOR. Charles A. Ives, Erie, Pa., assignor to General Electric Co. Application June 5, 1935, Serial No. 25,062. 9 Claims. (Cl. 230-202)

2,050,192. MILK COOLER. Lee W. Melcher and James B. Fisher, Waukesha, Wis., assignors to Waukesha Motor Company, Waukesha, Wis. Application April 23, 1934, Serial No. 721,894. 8 Claims. (Cl. 62-101)

#### PATENTS

HAVE YOUR patent work done by a specialist. I have had more than 25 years' experience in refrigeration engineering. Prompt searches and reports. Reasonable fees. H. R. VAN DEVENTER (ASRE), Patent Attorney, 342 Madison Avenue, New York City.

#### Export Firm Moves to New Headquarters

NEW YORK CITY—P. M. Mahler & Co., Inc., export firm, recently moved its offices to 155 Broad St. in order to facilitate work with International Acceptance Co., which is financing foreign sales for the export company's clients.

Appointment of R. F. Mahler as secretary-treasurer and of Fritz Mahler, formerly in the service of the Danish government, as assistant secretary, was recently announced by P. M. Mahler, president of the firm. Paul Falk was appointed assistant to the president. Mr. Mahler will leave on his fourth trip to Latin America about Oct. 1. In addition to his duties as president, he is supervisor of South American sales for the organization.

#### Porcelain Institute Issues Four New Booklets

CHICAGO—Four new booklets on the use of porcelain enamel are being distributed by the Educational Bureau of the Porcelain Enamel Institute.

Two of the pamphlets, "Handbook on Design of Metal Parts for Porcelain Enameling—No. 1" and "Reflectance Test for Opaque White Porcelain Enamels" are of technical nature.

The design book, according to the Institute, gives the basic requirements for the proper designing of pressed steel shapes to be porcelain enameled. The reflectance test booklet is a tentative standard for conducting reflectance tests which have been approved by the Technical Research Section of the Institute's Educational Bureau.

"Sales Manual for Porcelain Enamel" discusses all phases of enameling and gives selling points for the manufacturer, distributor, and retailer.

#### New Distributorship Gets Spartan Franchise

NORFOLK, Va.—B. M. Cuthrell of this city and P. G. Blanford of Portsmouth, Va., have formed the P. G. Distributing Corp. at 410 Monticello Ave., to distribute Spartan refrigerators for four counties in southern Virginia, and 24 counties in eastern North Carolina.

Two carloads of Spartan units have been shipped to the new distributorship. Both Mr. Cuthrell and Mr. Blanford have been Spartan distributors for many years.

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### AN AMAZING VALUE

Hundreds in use. Perfect refrigeration for meat, dairy and delicatessen products and all perishables sold in food stores. Write or wire for all the facts.

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**THE IDEAL-30 CU. FT.-REFRIGERATOR!**  
MODEL No. 350—FOR SMALL RESTAURANTS, LUNCH ROOMS, BARBECUE STANDS, AND WHEREVER LIGHT REFRESHMENTS ARE SERVED  
A practical all-metal Cabinet, white DuLux or Porcelain finish—3" insulation—perfectly designed coil bunker—restrained steel shelves—bright chromium hardware.  
Originally a solid 4-door Cabinet, the two top doors may be transformed to display type if desired, giving a shelf area of 9 sq. ft. Lower compartment, likewise equipped with shelves, has an area of more than 19 sq. ft.  
MORE STORAGE SPACE for its size—58"x48"x28"—than any other cabinet—and the price will surprise you.  
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BETZ CORPORATION BETZ BUILDING Hammond, Ind.

## Patents

Issued August 4, 1936

2,049,413. DEFROSTING DEVICE FOR REFRIGERATORS. John W. Cannon, Plainfield, N. J. Application September 3, 1932, Serial No. 631,689. 11 Claims. (Cl. 62-4)

2,049,594. DISPLAY CASE. Ernest L. Stultz, Kansas City, Mo., assignor to Viking Refrigerators, Inc., Kansas City, Mo. Application February 10, 1936, Serial No. 63,092. 4 Claims. (Cl. 312-128)

2,049,625. AUTOMATIC DEFROSTING DEVICE. Siegfried Rupprich, New York, N. Y. Application December 16, 1930, Serial No. 502,677. 17 Claims. (Cl. 62-2)

2,049,664. REFRIGERATION APPARATUS. Loyd W. Rinaman, Dallas, Tex. Application November 2, 1934, Serial No. 751,229. 4 Claims. (Cl. 62-5)

2,049,708. REFRIGERATOR. Gustav Lieb, Stuttgart, Germany, assignor to Robert Bosch Aktiengesellschaft, Stuttgart, Germany. Application December 12, 1933, Serial No. 701,993. In Germany December 14, 1932. 2 Claims. (Cl. 62-126)

2,049,731. HUMIDIFIER. Everett D. Betts, Dowagiac, Mich., assignor to The Rudy Furnace Company, Dowagiac, Mich. Application February 24, 1934, Serial No. 712,769. 9 Claims. (Cl. 126-113)